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Conventionalizing Geographic Investigation and Presentation

The increasing number of papers offered for presentation during recent years has congested the calendar of the annual meetings of the Association. Some members have felt that the many titles on each half-day's program have curtailed and in numerous instances eliminated discussion.

At the request of a considerable group of the membership, the secretary set aside one half day of the Evanston meeting for a correlated program under the heading which appears at the top of this page. Three interested members, S. D. Dodge, Glenn T. Trewartha, and Derwent Whittlesey, undertook the task of arranging a suitable program.

Instead of the nine or ten papers which make up the average session, three papers of the usual length were solicited, dealing with three aspects of regional geography ascertained to be of interest to a large number of members. Each of these papers was read prior to the meeting by persons designated to launch discussion of it. The comments which followed the presentation of each paper were stenographically recorded. The papers are here published as a group, and with them an abridgment of the discussion which each evoked.

The program of the session read as follows:

- Preston E. James—The Terminology of Regional Description. Discussion launched by R. H. Whitbeck.
Wellington D. Jones—Procedures in Regional Investigation. Discussion launched by Stanley D. Dodge.
V. C. Finch—Written Structures for Presenting the Geography of Regions. Discussion launched by Samuel Dicken.

The Terminology of Regional Description*

PRESTON E. JAMES

Words, whether they are technical ones or not, are valuable only as symbols standing for ideas or concepts. The demand for a technical term in any science arises from the sharpening of mental concepts by specialists to such a degree that these concepts can no longer be expressed by the rather blunt words of a lay vocabulary. Vague word definitions are a serious handicap to sharp thinking. But the English language already contains a great abundance of word symbols, and by speaking or writing with some attention to the finer shades of connotation, the most subtle concepts can be expressed. However, the specialist in regional description may develop ideas which are not provided for in the language; or he may require the special redefinition of certain words in order to sharpen their meaning or connotation to his particular needs. The use of special terminology for no other purpose than to impress is vicious, and can have, even for this purpose, only a temporary effect. On the other hand, if the specialist develops esoteric concepts for which the existing language is unable to provide an exact symbol, then the need for a new technical term is a real one. The final test by which to judge the value of a new term is not the word itself—not even its etymology; but rather it is the exactness and importance of the concept for which the word stands.

In this discussion, therefore, we must deal primarily with concepts, and only to a secondary degree with the symbols. Nor can we consider here the technical terminology of the special phases of regional description, such as landforms or settlement forms. This paper is limited to a discussion of some of the more recent concepts in regional geography and the symbols which express these concepts.

The recent refocusing of geographic interest on the face of the earth as our traditional field of inquiry has given new prominence to the old word, landscape.¹ This word has been used in geographic literature for a long

*The first of three correlated papers on CONVENTIONALIZING GEOGRAPHIC INVESTIGATION AND PRESENTATION. (See p. 77.)

¹The word "landscape" occurs in an Old English form (*landscipe*) before A.D. 1000, used in the sense of a region or extent of territory. The modern use of the word, however, is due to a reintroduction from the Dutch (*landschap*) in the early 17th century, primarily as a technical term applied to painting. This pictorial connotation was also introduced into the German where it was probably first used in this sense by the artist Dürer in 1521. Landscape, defined as an extent of territory and

time, having reference to the aspect of the face of the earth—an aspect built up of the associated material objects which exist together in the "zone of contact between the atmosphere and the lithosphere."² The geographer who uses this term, however, has given it, perhaps unconsciously, a special redefinition. In the popular vocabulary, landscape is "a portion of land or territory which the eye can comprehend in a single view."³ As the geographer uses the term, he refers, rather, to a portion of territory which is found to exhibit essentially the same aspect after it has been examined from any necessary number of views. Similarity of aspect or appearance, used in this sense, is not based on the superficial impression of resemblance which might be gained by an untrained observer, but requires the sophisticated judgment of a specialist in the choice of significant items of similarity. The concept, "essentially the same aspect," admits of degrees of resemblance. As the word is used at present, some writers would limit its application to the specific similarities of such unit areas as form the smallest divisions of Finch's map of the Montfort area.⁴ Others recognize more general similarities, such as might exist in a "Corn Belt Landscape." We shall return to this problem a little later.

Various terms have been used to express the assumed division of a landscape into human and non-human parts. To an intellect quite removed from our earth, and so able to see mankind against the background of the universe in proper perspective, the supreme arrogance implied by the words, "Man and Nature" would not have occurred. "Man and Nature" is a human concept; yet many times we are brought painfully to realize that man is distressingly natural. It seems closer to the truth to think of man as a part of nature—as one element among others which together form the pseudo-organic unity which we call the landscape.

Various terms still in common use, therefore, seem unsatisfactory because of the connotations which cling to them. Natural environment, natural setting or natural landscape all suggest a separateness of man from

without a pictorial connotation, is found in all the basic Germanic languages (e.g., Old Saxon, "landskepi"; Old High German, "landskaf"; Middle Low German, "lant-schap"; Old Norse, "landskapr," etc.). This definition is implied in all the modern definitions of the word given by the standard authorities (Oxford English Dictionary; J. F. Bense, Dictionary of the Low Dutch Element in the English Vocabulary, The Hague, 1932; and Falk und Torp, Norwegisch-dänisches etymologisches Wörterbuch, Heidelberg, 1910), and is explicitly stated as a definition by H. C. Wyld (Universal Dictionary of the English Language, London, 1932).

² Sten de Geer, On the Definition, Method, and Classification of Geography, *Geog. Annaler*, 1923, pp. 1-37.

³ Webster's International Dictionary.

⁴ V. C. Finch, Montfort—A Study in Landscape Types in Southwestern Wisconsin, *Geog. Soc. of Chicago, Bull.* 9, 1933, pp. 15-44.

the other parts of an area. The adjective "geographic," as geographic environment or geographic factor, seems even more objectionable. This is a very misleading use of a word which identifies the subject as a whole with only one part of its field. If we admit man and the works of man as a part of the landscape then the human elements are no less geographic than the non-human elements. Furthermore, this use of the word, like those which employ the adjective "natural," is inherited from the period when our subject was widely defined as a study of the influence of environment on man. Those of us who have found this limitation of the geographic field unsatisfactory have been forced to seek another term to indicate the non-human part of the landscape, if for no other reason than to suggest the new way of thinking about the relations of man and the earth.

Leighly was the first to give the word "fundament" this technical sense.⁵ By an extension of its dictionary meaning, fundament is used to indicate the foundation on which the works of man have been built. Fundament may be defined as the face of the earth as it existed before the entrance of man into the scene. The changes introduced by man are measured in reference to this geographic datum plane—the unmodified earth with its landforms, its soils, its vegetation, its faunas untouched by human hand. This is a datum plane which must be largely reconstructed from fragmentary evidence, so great have been the changes wrought by mankind.

Various words, also, have been used to refer to the modifications of the fundament—to man and his works. Many writers describe the aspect of the face of the earth which results from the presence of man as the cultural landscape—the natural landscape modified by man. Perhaps the chief objection to this is that it suggests the existence of two landscapes—a natural and a cultural one. As a matter of fact the fundament ceases to exist and is replaced, after the arrival of man, by the cultural landscape. There is, after all, only one landscape.⁶

The process of entering and living in an area and the transformations of the original scene which result are included by many writers in the term "settlement," used in its generally accepted meaning. However, there is an objection to the use of this word to refer in general to the processes of occupying all areas. Settlement, as defined in the dictionary, carries with it the implication that people or colonies are establishing themselves in a fixed position. To speak of settlement by a nomadic culture would seem to be paradoxical. In the limited sense connoting the establishment

⁵ John B. Leighly, *The Towns of Mälardalen in Sweden, A Study in Urban Morphology*, Univ. Calif. Publ. in Geog., Vol. 3, 1928, pp. 1-134; reference on p. 3.

⁶ C. O. Sauer, *The Morphology of Landscape*, Univ. Calif. Publ. in Geog., Vol. 2, 1925, pp. 19-53.

of people on the land in more or less permanently fixed positions, and also the various forms resulting from this, the word settlement seems to be quite satisfactory. A more general term, however, referring to all methods and processes of living in areas, and the resulting forms, is needed. This is supplied by the word "occupance." Occupance is an obsolete word, revived by Platt, Whittlesey and others, and defined as the process of occupying or living in an area, and the transformations of the initial landscape which result. There is no distinction, it seems, between occupancy and occupance, although the desirability of adopting one term is apparent. A distinction is made, however, between occupance and occupation. Occupation refers specifically to the economic activities of a people, that is, to their mode of gaining a living from an area or in an area. Occupance refers not only to these economic activities but also to other activities only indirectly or not at all related to the economic life—such as the construction of buildings, roads, and so on. The word includes also the results as well as the process of living in an area.⁷ Occupance is the general term which would apply to those "essential facts" of human geography described by Brunhes.⁸ One can avoid the confusion of occupance with occupants by substituting for the latter the word inhabitants. The phrase "cultural impress," suggested by Whitbeck, is a synonym for that part of the meaning of occupance which refers to the results of the process of occupying an area—the material evidences in the landscape of the presence of man.

Each type of human culture has its own mode or modes of occupance, and as a result, its own characteristic impress. In most parts of the world the first inhabitants to effect a transformation of the fundement have been replaced by other human groups with different cultures. The forms of the later cultures are superimposed, not on the unmodified fundement, but on the fundement as previously transformed by the earlier occupance. Thus most landscapes today are composed of a complex of occupance patterns superimposed on other occupance patterns. Whittlesey has suggested the phrase "sequent occupance" to refer to this sequence of cultures and cultural impresses.⁹

This brings us to another phase of this discussion. There seems

⁷ This statement of the meaning of occupance was formulated in 1932 at a conference attended by: C. C. Colby, S. D. Dodge, W. L. G. Joerg, R. S. Platt, D. S. Whittlesey, and the writer.

⁸ J. Brunhes, *Human Geography*, New York, 1920.

⁹ D. S. Whittlesey, Sequent Occupance, *Ann. Assn. Am. Geogrs.*, Vol. 19, 1929, pp. 162-166.

See also, L. F. Thomas, The Sequence of Areal Occupance in a Section of St. Louis, Missouri, *ibid.*, Vol. 21, 1931, pp. 75-90, and S. D. Dodge, Sequent Occupance of an Illinois Prairie, *Bull. Geog. Soc. of Phila.*, Vol. 29, 1931, pp. 205-209.

at times to be a considerable break between the geographers of an older generation in America, who described their objective as the study of the influence of environment on man, and the younger geographers who have largely abandoned this description of their field. Perhaps this break is more apparent than real. Some of the younger geographers have adopted the broader traditional definition of their objectives as the description and interpretation of the face of the earth. This does not exclude the relation of man to his physical environment; nor does it define the subject in terms of this narrow specialty. But of much greater importance than the statement of objectives are the techniques employed to reach them. There are many people who believe that the most important contributions of geography to the world's knowledge have come from an application of the technique of mapping distributions and of comparing and generalizing the patterns of distribution. Many developments in neighboring fields, such as anthropology, plant and animal geography, geology, and meteorology, have been stimulated by adopting this technique of plotting things on a map. No contributions of a similar importance can be claimed, it seems, by those misguided persons who have, during the era recently ended, sought to give practical service to big business by descriptions of commerce and industry only vaguely related to the map. That geography can render practical service has been amply demonstrated, but such service comes from the field mapping of the significant features of fundament and occupancy in small areas.

The mapping technique leads to the study and comparison of distribution patterns. The various elements of the landscape which the trained specialist deems of critical importance are mapped and their patterns compared. Not only are patterns of the occupancy related to the patterns of the reconstructed fundament, but also the various elements of the occupancy are related to each other, as, for example, fields and houses to roads and railroads.¹⁰ The application of comparative pattern studies may claim for geography recognition as an exact science especially when the correlations of various elements can be given mathematical description as Finch has done in the Montfort paper.¹¹

The terminology of this phase of geography is yet to be developed. It

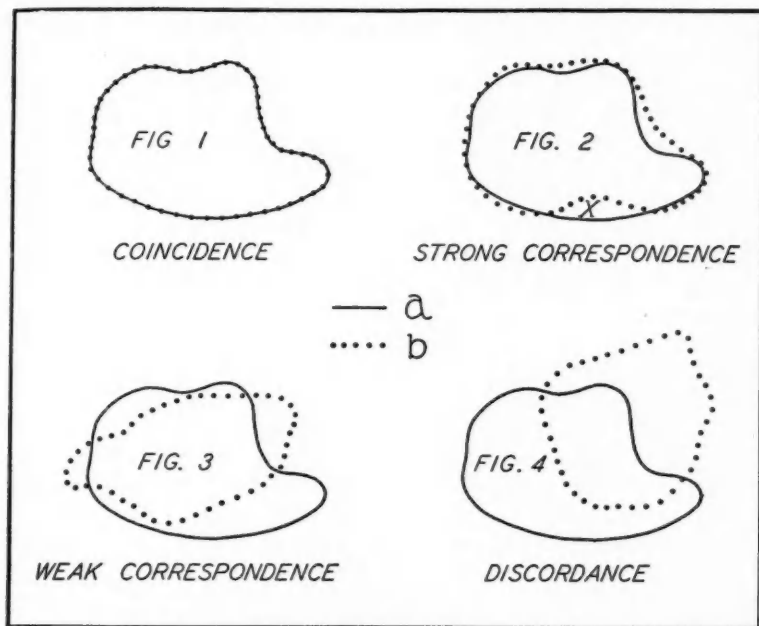
¹⁰ For example:

S. D. Dodge, *The Vermont Valley; A Chorographical Study*, *Papers Mich. Acad. of Science, Arts and Letters*, Vol. 16, 1931 (published 1932), pp. 241-274;

P. E. James, *The Coffee Lands of Southeastern Brazil*, *Geog. Rev.*, Vol. 22, 1932, pp. 225-244.

¹¹ See also, P. E. James, *The Blackstone Valley, A Study in Chorography in Southern New England*, *Ann. Assn. Amer. Geogr.*, Vol. 19, 1929, pp. 67-109.

may be possible at this time, however, to suggest a possible direction in which this development may proceed. Conceivably when two landscape elements exist together in an area, their distribution patterns may be re-



lated to each other in three essentially different ways. In Figure 1 the two objects, a and b, occupy the same area—in which circumstance it is suggested that their patterns of distribution may be said to coincide. In Figure 2, a and b do not occupy exactly the same area, but their patterns bear a strong resemblance—and for this type of pattern relationship it is suggested that they be said to correspond. Where the similarity is close we may speak of a strong correspondence; but where the similarity is not so close, but still visible, as on Figure 3, we may speak of a weak correspondence. The third chief kind of relationship is found where a and b show no similarity in their patterns of distribution, as on Figure 4, which may be described as a discordant relationship. Where a coincidence of patterns is demonstrated the geographic evidence points strongly to the conclusion that one is the sole cause of the distribution of the other, or that both are the result of something else, which, when mapped, would coincide with a and b. On the other hand where patterns correspond, the logical

conclusion from the geographic evidence is that one is an important cause of the distribution of the other, but that other factors must also be considered in accounting for the distribution. In this kind of a study the attention is focused, as it should be, on the places where a and b fail to agree in pattern, as at x on Figure 2. Discovery of the discordances is fully as important as the discovery of correspondences. Instead of the subjective description of alleged coincidences of distribution which has characterized much of the geographic writing of the past, the new technique calls for the collection and presentation of objective evidence in the form of mapped distributions, from which even a mathematical statement of the degree of correspondence can be worked out.

In recent years, however, while studies of a more and more microscopic character have been presented, many geographers have questioned the significance of these very detailed investigations. Where surveys employing a corps of field workers have compiled detailed maps of relatively large areas, as in the case of the Michigan Land Economic Survey,¹² there is no doubt of their value. But where individual geographers have concentrated their efforts on small areas, it has been the cause of considerable bewilderment to find that the more detailed and specific is the study the more insignificant are the results—except as the study may illustrate a novel technique. In other sciences the refinement of detail has led to the establishment of principles—but not so in geography.¹³

The answer to this apparent paradox lies in the nature of our field. Geography, along with such sciences as astronomy, is engaged in the study of phenomena much larger than the observer. The reality which we are seeking to penetrate is the reality of the macrocosm, not of the microcosm. In other sciences the broader relationships are the most obvious ones; but in geography it is the overwhelming detail which is, actually, obvious. Like a microbe crawling over the face of a newspaper photograph, we may focus our attention on the details of the printed dots; but until we generalize those dots the larger design of the photograph lies beyond the range of our vision. The more closely we study the shape and arrangement of the dots the less we see of the larger pattern. Until we bring the larger relationships within the range of our vision by making use of the map, the significance

¹² C. P. Barnes, Land Resource Inventory in Michigan, *Econ. Geog.*, Vol. 5, 1929, pp. 22-35;

L. R. Schoenmann, Land Inventory for Rural Planning in Alger County, Michigan, *Papers Mich. Acad. of Science, Arts and Letters*, Vol. 16, 1931 (Published 1932), pp. 329-361.

¹³ O. D. Von Engeln, American Tendencies in Geography, *Scientific Monthly*, Vol. 17, 1923, pp. 326-341.

of what we see is lost. But is not the geographer's primary objective the recognition of these larger patterns—even of the major lineaments of the face of the earth? May not the detailed study of the dots be made significant if the larger patterns of distribution are recognized, and if the relationship of the detail to the more general is demonstrated?

Geographic generalization can be effected at an almost infinite number of different scales.¹⁴ Even the most detailed studies of small areas are to a certain extent generalized. At the opposite extreme are the broadest divisions of the face of the earth—the major lineaments. In between these extremes lie the regional divisions of the continents. It is convenient to recognize three orders of generalization; and the terms to express these orders are ready at hand. The word "topography," before its misuse by geologists to mean landforms became common, was defined as the description of a small area. It is still defined in this way in Webster's Dictionary; and the topographic map, which carries not only the relief features, but also the drainage, the vegetation, and the forms of human occupancy, still demands the use of this word in its original sense. Geographers should at least take care to avoid the error introduced by geologic writing; perhaps it may still be possible to regain for this word its former meaning—to stand for the detailed description of a small area, such as Finch's study of Montfort. More general than the *topographic* studies are the *chorographic* studies, such as Baker's Agricultural Regions of North America; and still more general than the *chorographic* studies are the descriptions of world distribution on a *geographic* scale.¹⁵

To many people the word generalization connotes superficiality. There are plenty of examples of superficial studies—but the superficiality consists

¹⁴ Compare the concept of "größenordnungen" in S. Passarge, *Wesen, Aufgaben, und Grenzen der Landschaftskunde*, *Pet. Mitt., Ergänzungsheft* 209, 1930, pp. 29–44; reference on p. 33;

See also: C. Vallaux, *Les Sciences Géographiques*, Paris, 1929, ref. on pp. 146–174; and

A. Hettner, *Die Geographie . . .*, Breslau, 1927, references on pp. 217–224, and 345–349.

¹⁵ The concept of the orders of generalization is of sufficient importance to merit the invention of new terms, especially as there are many who do not believe that the former meaning of the word "topography" can be reestablished. It has been suggested that the word *microchore* might stand for the detailed studies of small areas (on scales of larger than 1/75,000); and that *mesochore* might stand for the regional studies; and that the studies of world-wide distributions might be indicated by the word *macrochore*. These terms are composed of the Greek words "micro," "meso," and "macro" (small, medium, and large) combined with "chore" (from "choros," meaning region or area). Finch's paper on Montfort, in these terms is a *microchoric* study.

of inadequate or hasty generalization. The principles of all sciences consist of constantly criticized generalizations, which draw attention to broad similarities and neglect detailed differences. To say, for example, that men are taller than women is to recognize a general truth: yet no one would expect all men to be taller than all women. When we generalize we must be consistent. We must not attempt to identify such regional or chorographic (mesochoric)¹⁶ boundaries as those of the Corn Belt in the topographic (microchoric) detail of a small locality. Nor should we compare patterns drawn on a geographic (macrochoric) scale with other patterns drawn on a chorographic (mesochoric) scale, as, for example, when the lines of a world classification of climates are compared with vegetation lines drawn in much greater detail. The more we investigate a generalization in detail, the more we appreciate the detailed differences; but is not the general design of the face of the earth just as real as the more specific reality of the topographic (microchoric) unit? To deny this is to assume the vision of the microbe on the photograph and to deny the reality of the larger picture which cannot be seen for the dots. The detailed study of the small area becomes significant in so far as it contributes to the more accurate generalization of this detail on chorographic (mesochoric) or geographic (macrochoric) maps; and the larger patterns themselves become more than superficial only to the extent that they are based on detailed distributions.

Perhaps the work of all schools of geographers could be made more harmonious if we would appreciate the importance of these orders of generalization. The topographic (microchoric) studies are vital parts of the chorographic (mesochoric) or geographic (macrochoric) investigations; but before the topographic (microchoric) studies are made significant their relationship to the larger patterns must be demonstrated. According to this point of view the larger distribution patterns of the chorographic (mesochoric) or geographic (macrochoric) scales constitute the fundamental principles of our science.

*University of Michigan,
January, 1934.*

¹⁶ The terms "microchore," "mesochore," and "macrochore" are here proposed as substitutes for the "topographic unit," the "chorographic unit," and the "geographic unit," respectively (see page 85). They were evolved in a series of informal discussions which spontaneously occurred subsequent to the presentation of this group of papers. Like many other terms in current technical use, they are the joint product of more than one mind. (Ed.)

Whitbeck, R. H.—Professor James has raised many interesting questions. Time is insufficient to attempt to discuss all of them, and I shall confine myself to a minor part of his paper. I am especially interested in the process by which new geographical terms are acquired. At the present time we are coining them slowly and our geographic vocabulary is not growing very fast. Since the science of geography is growing, we need occasional new terms. There seem to be at least three ways by which we are adding them: (1) by coining new words; (2) by translating or re-making foreign words, as *umland*; (3) by adopting an existing word and assigning to it a new meaning, as, "fundament." This last term is a biological one which had not previously been used geographically. The word has certain merit, in that it suggests something fundamental, but should we take a word from biology, especially a word whose long-established meaning is so utterly unlike the geographical meaning which we propose to give to it?

The second kind of new term is a translation, or is the result of an effort to translate a foreign word into an English equivalent, as, for example, "landscape." So far as I know, the first American writer to give this word new meaning was Sauer in his article on the Morphology of Landscape. It comes from a German word (*landschaft*) which has no exact English equivalent. I see no serious objection to adopting this word, but there is one difficulty; the English word "landscape" has an established meaning and is not the equivalent of the German word *landschaft*, and therefore it does not fit into our needs as well as the German word fits into the German needs. Shall we reject the word, or shall we say that its meaning is quite near the German original and therefore satisfactory? The difficulty is that the word in the German means much more than "landscape" means to us. A new meaning for the word "landscape" can not be put into the dictionary at once and readers are likely to be confused by the use of the familiar term in an unfamiliar sense. Granting the objection to this word, is it still a desirable one to add to our vocabulary? On the whole, I should say yes. We should, wherever possible, get a word that already has a meaning closely similar to that which we wish it to have. We should ask, before a new word is offered, "Will this word by its fitness and its sound win friends?" Some terms are pleasant to the ear; I like Whittlesey's phrase "sequent occupance," and Trewartha's "confluence site." They have a pleasant sound and they have the advantage of meaning what their derivations suggest. These are two qualities that a new word ought to have: it should have an agreeable sound, and should define itself. Herein lies the fault of "conurbation." It may stand analysis, but the word does not win my friendship. It sounds too much like the name of an im-

modest disease. The quality in its favor is cancelled by its disagreeable sound.

Our terminology has grown by the method of catch-as-catch-can. Some words which should live, die, and some which should die, live. I sometimes wonder if there is not a real need for a Board of Reference to which words seriously proposed for addition to our geographical terminology may be referred? Is this question of enough importance to be referred to our Council with a request that they consider the selection of a Board of Reference to pass upon suggested new terms? Would we agree to abide by their decisions? At least such a plan would give us a more orderly system of procedure than we now have.

Whittlesey, D. S.—Along the lines that Mr. Whitbeck was discussing is the sore point of using old words to carry new meanings. The words Mr. James used, for which I should like to call him to task, are "topographic" and "geographic." Topographic has been used by the geologists in such a special sense that to nine Americans out of ten it no longer means what it ought to mean. Geographic means a different thing to every different person. For that reason, I have a feeling that geographic, chorographic, and topographic, which should be useful as Dr. James describes them, are not really useable, and I think we are fighting a hopeless battle if we undertake to establish new connotations for words in practical use. I should be disposed to vote "No" on any currently used word that already has an accepted meaning, no matter how useful it promises to be as a special term. With that group out of the way, I think we would be spared the harassing fate of the geomorphologist, whose efforts at definition often resolve into lengthy arguments as to what hill, or valley, or some other common English word should mean to the specialist. If we eliminate common words which, like ancient coins, are worn beyond recognition, we must borrow foreign words which, for most Americans, have no meaning, or resurrect obsolete words—two reserves to draw upon, aside from coining new words.

I should like to ask Mr. James to suggest what he considers the major terms useful in describing principal features. I think I have caught him using in print "surface configuration" and "landforms." Does he make a distinction between them? Has he an idea of different orders of magnitude as being tied up definitely to different words?

James, Preston E.—It is the concept behind the words "topographic, chorographic, and geographic" which is important. There is a great deal of confusion in geographic thinking and writing because of a failure to distinguish clearly between the specific and the general. In the field of land utilization, we may draw detailed maps of land use, or we may generalize

those maps into "types of farming" areas, or we may generalize still more broadly by recognizing agricultural regions. In my opinion it is illogical to search for the exact position of a regional boundary in the detail of a topographic map. And even more illogical is the attempt to correlate a distribution drawn on a small scale with other distributions drawn on a large scale, as, for example, a world map of climate with a vegetation map compiled in topographic detail. It seems to me that the importance of clearly separating the scales or orders of generalization is so great that some terms to express these orders are demanded.

I had personally decided to abandon the word "topographic" until, last summer, Professor Sauer inspired me to continue its use in the traditional sense. Perhaps this word can yet be returned to its dictionary meaning.

In answer to Mr. Whittlesey's last question, I am using the phrase "major lineaments" to describe the surface features of the earth on the broadest scale; "surface configuration" to describe the surface features within regions; and "landforms" to describe the topographic details of surface form.

Matthes, F. E.—I agree that the word *topographic*, as applied to maps, is not being used in its original sense. When I was a map maker I bewailed that fact, and I sometimes hoped that an effort would be made to restore the original significance of the term. I now realize that there is little hope of that ever being accomplished, for the word *topography* is in use not merely among geographers and geologists but among engineers also. We geographers might possibly succeed in inducing the geologists to follow us in a strictly correct usage of the term, but never in the world the engineers. For *topography* is now definitely fixed in the language of the practical engineer as a shop term, and it can no longer be uprooted. I believe I am in a position to make this assertion, being myself a member of the engineering profession.

Martin, Lawrence.—It is quite impossible to upset usage. If we start to make new connotations for our words, we shall run up against the obstacle of usage. As an example, I live in a city where there are many negroes, who call themselves colored people. I am sure that black is not a color, so the usage is improper. Also, it is certainly improper to call the original inhabitants of North America (red men), Indians, because the people of India are properly called Indians. Yet usage makes us call the North American, Indian. It is impossible to achieve perfection of description. I think it would be desirable to use "topographic" for maps showing the distribution of anything. Instead of criticizing our use of the word topographic for maps with contours or hachures, why not admit we have simply improved the topographic map?

Brown, Ralph.—I should like to ask the original speakers in regard to the birth of geographic terms, whether they include in their categories those terms which grow out of the language of inhabitants. Mr. Whitbeck gave us three possibilities. Most of us have encountered regions where we found the inhabitants used specific words for certain features. Some of these are purely geographic. It seems to me when we do encounter such words or phrases, it is desirable to adopt them and perhaps define them in a more scientific way than the inhabitants have already done.

Joerg, W. L. G.—I should not like this discussion to go by without emphasizing the fact that the speaker has made a major contribution on the subject of "detailed" versus "generalized" study. He has given us a key to understanding the validity of both types of work being done, the generalized presentation of the geography of a large area as well as the intensive study of a small area. Neither is wrong in method; each has its justification. It is a question of scale or order of magnitude.

Trewartha, G. T.—I find that in writing I need a few synonyms. I cannot believe accurate writing can get along with a single term for each concept. We should think about the problem of synonyms.

The terms "fundament" and "natural landscape" are not identical to many geographers. The former refers to the original unchanged natural set-up of an area; in other words, the original natural landscape. But many geographers prefer not to go back and recreate a picture of the fundament; they begin with the present and therefore are compelled to deal with a somewhat modified fundament. This they speak of as the natural landscape to distinguish it from the array of observable features resulting exclusively from human occupancy—the cultural landscape. Two terms are needed then; one to express the concept of the pre-human morphology of an area; the other to indicate the somewhat modified physical set-up.

I think words should have a period of probation; some may be strangled in their infancy. Those which survive may very well go on. But I am not sure whether a Board should pass on them as to whether they are good or bad. It should pass on the strict meaning of the word. Then let the geographers use the word. The Board will do a great service in putting into print the exact meaning of these terms, but the final court of appeal as to whether they should survive or suffer extinction would be the geographers themselves.

Whittlesey, D. S.—Mr. Trewartha raises a point with which I am in close accord. I like to use the phrase "natural environment," in antithesis to the complex of cultural items in the landscape (Mr. Whitbeck's "cul-

tural impress"). I often need a name for each of these concepts without reference as to how it fits into a modified fundament.

As to the use of synonyms: I hope that when Mr. Trewartha does scientific writing he will use one exclusive term. In ordinary talk and in popular writing he may use any number of synonyms. However, it seems to me that even there we shall be on safer ground if we employ synonyms sparingly.

Bollinger, C. J.—I would hesitate to limit geographic concepts. I would object to limiting geography to just studies of world-wide scope. Geography covers also small, local areas.

James, P. E.—I never intended to rule out local studies. Perhaps a new meaning and vitality can be given to detailed studies by an understanding of their relation to the more general. What I am suggesting is that we should be conscious of the scales of generalization, and remain consistently on one scale.

Stamp, L. D.—I find the discussion stimulating. I am representing the European point of view. It would be a great mistake if we introduced new terms which would mask our real meaning. The word "stow" has been suggested for small regions. I think it is a good word, but it has not survived. One difficulty is that we are dealing with terms that are English. We are all English-speaking geographers. We must remember that there is a great group of European geographers who are doing good work in other languages. Our words should be self-explanatory from an international point of view.

Mr. James pointed out the degrees of coincidence, which I think is by far the best part of his work. But drawing lines is also a very dangerous thing to do because as soon as we put a line on a map, we try to give it a precise meaning.

James, P. E.—There is a most important difference between what the English geographers are doing and what we are doing under the heading of "pattern geography." The recognition and delimitation of a general region cannot well be given mathematical precision—but specific facts can be mapped not only in detail, but also on the broadest world scale by the use of isopleths. While the course of these lines is generalized on a world map, the lines themselves can be given exact quantitative definition. By comparing the patterns brought out by these lines we can not only recognize more clearly the regional units, but also we can determine just how strong a correspondence there is among the various regional elements—in other words, we can measure the strength or weakness of the regional generalization.

Stamp, L. D.—I am afraid of a mathematical fixity of lines. Correla-

tion of pattern by fixed lines is dangerous. I prefer to have two patterns undefined by mathematical lines rather than to eliminate all patterns.

Strong, Helen.—We cannot express geographic ideas clearly unless there are terms for these ideas. Geography, the same as other sciences, requires a nomenclature. Lack of it limits the developments of the science. Better geographic thinking and exposition will result from word vehicles to express geographic facts and principles, and through their common use other students will realize that geographers are working in a clearly defined and tangible scientific field.

Procedures in Investigating Human Occupance of a Region*

WELLINGTON D. JONES

Investigative procedures and techniques employed by individual geographers engaged in regional study display great variety. Such variety is both inevitable and desirable for at least three reasons: (1) regions differ greatly in character, (2) objectives in investigation are not all alike, and (3) investigators possess highly diverse experiential backgrounds. Nevertheless, although no one procedure can or should be rigidly applied in all cases, certain kinds of standardization in regional investigation as pursued by geographers are highly desirable if data collected by one student are to be usable by others, if results obtained by different workers are to be comparable, if conclusions reached by a particular investigator are to be tested by others, and if investigation is to yield larger rather than smaller returns for a given amount of time invested. It is the purpose of this paper to provoke discussion along what the writer believes to be desirable lines of standardization.

DISTINCTIVENESS OF REGIONAL STUDY BY GEOGRAPHERS

Geographers are not the only students of regions. The existence of more or less clearly defined extensive areas within which there is noticeable uniformity or homogeneity has long been recognized even by the layman, and in many cases regional names have come into common use for labeling such areas. In scholarly circles, geologists, botanists, zoologists, anthropologists, economists, sociologists, political scientists, historians, and workers in various other disciplines distinguish and investigate regions. The regions determined by geographical investigation, however, and the characteristics of regional investigation as pursued by geographers, are different from the regions and the investigations of workers in the other disciplines. Perusal of published regional studies establishes this point so positively that it need not here be elaborated. Such a perusal of published studies also reveals the fact that geographers do something other than investigate in succession the geology, the botany, the zoology, the anthropology, the economics, the sociology, the political science, and the history of a region.

*The second of three correlated papers on CONVENTIONALIZING GEOGRAPHIC INVESTIGATION AND PRESENTATION. (See p. 77).

Such a task, whatever its value might be, would call for mastery of too many disciplines. On the other hand, if geographers, recognizing their lack of fitness to make the series of geological, botanical, and other studies referred to, restricted their efforts to making syntheses for regions on which these other studies had already been made by workers in the several disciplines involved, geographical investigation of most regions would be postponed indefinitely.

Various definitions of the field of geography have been formulated and are in common use. The chief utility of these definitions is to establish clearly the objectives of geographic investigation, and to prevent unnecessary duplication of effort between geographers and other scholars. Each of the current definitions of geography has its ardent devotees, and valuable results are being obtained under each of these general statements of objectives. For the purposes of this paper it is sufficient to record the writer's conviction that all commonly accepted definitions of geography include the study of "human occupance of regions," and that no other recognized discipline is so particularly concerned as is geography with the intimate association of peoples with the areas they occupy. It is with investigative procedures in the study of the utilization of areas by the inhabitants thereof that this paper is specifically concerned. Such investigation, designed to give an organized understanding of human occupance of the various regions of the earth, is, in spite of differences in terminology, in distribution of emphasis, and in scope, essentially regional study in what has variously been called "human geography,"¹ "human ecology,"² "cultural geography,"³ and "geography of the cultural landscape" ("Kulturlandschaftskunde").⁴ Under each of these labels, no one of which of course is a precise synonym for the others, attention is directed to population groups as active agents, to the surface of the earth as the stage on which mankind acts out the drama of civilization, to human activities, to the influence of natural environment on human activities, to relations between nature and man, to human adjustments to the natural environment, to the material works of man, to landscape (with respect to what have been called morphology, physiology, and historical development), to structure of area, to areal mosaics, to functional patterns of areas, and to

¹ Vallaux, Camille: "Human Geography," in *Encyclopaedia of the Social Sciences*, Vol. 6, pp. 624-626.

² Barrows, Harlan H.: "Geography as Human Ecology," in *Annals of the Association of American Geographers*, Vol. 13 (1922), pp. 1-16.

³ Sauer, Carl O.: "Cultural Geography," in *Encyclopaedia of the Social Sciences*, Vol. 6, pp. 621-624.

⁴ Waibel, Leo: "Was verstehen wir unter Landschaftskunde?" in *Geographischer Anzeiger*, Vol. 34 (1933), pp. 197-207.

integrated areal patterns—to quote a few of the many catch phrases in current use.

Irrespective of particular statements of objectives, there is a series of steps, processes, or methods of thought involved in regional geographic investigation. These steps or processes are (1) discovery, which in field work calls for observation and interviewing, (2) record, which in large part is depiction, (3) analysis, which involves classification, (4) interpretation or explanation, (5) integration, and (6) appraisal, which leads into the realm of prediction. No one of these processes, as applied in investigation, is completed before another is begun. Nevertheless, the larger part of discovery and record must be completed before much analysis, interpretation, and integration is attempted, and appraisal surely should come last, if attempted at all.

USE OF A CHECK LIST IN INVESTIGATION

Investigation in any science presupposes a more or less definitely organized list of items or phenomena on which attention will be focused. The content of any such list of phenomena to be studied will of course be determined in the light of general as well as specific objectives set up for a particular investigation. Numerous generalized outlines or check lists have been prepared by geographers to serve as guides in regional investigation. The check list which is here presented is a kind of descendant of one which the writer helped prepare in 1915. It displays some traits inherited from its early ancestor, and other traits acquired from the intellectual environment in which its author has lived since 1915.⁵

Investigation of human occupancy of a region involves the consideration of several closely related groups of phenomena: (1) the material "works of man" (occupance features) which occupy areas on the surface of the earth—works constructed and used for production of commodities, for transportation, for sale of commodities and services, for habitation, for recreation, for government, for education, for religion, and for other pur-

⁵ The ancestral check list referred to is Jones, Wellington D., and Sauer, Carl O.: "Outline for Field Work in Geography," *Bulletin of the American Geographical Society*, Vol. 47 (1915), pp. 520-525. Since the publication of this early list countless discussions with other geographers, perusal of numerous published studies, and personal field experiences have had their inevitable effects on the ideas of the author of the present paper. No attempt is here made to give specific credit to the many individuals to whom the author is under debt for his ideas. Probably no single idea in this paper is entirely original with the writer. He is unable in most cases to determine accurately his intellectual debt to individuals. The development by the author of this paper of a list containing essentially the same categories as those herewith presented dates from about 1926.

poses; (2) the "natural layout" of land forms, soils, climate, and other associated natural features occupied or otherwise involved in production, transportation, and the other purposes noted above; (3) the population involved; (4) connections and relations with other regions. The center of interest in investigation, or at least the initial attack, is on the material works of man which occupy area, as they can be observed today, in functional associations (operation units and groups of units). Past stages of human occupance of the region, however, are important, for present-day occupance in every region is based on and has its roots in earlier stages of occupance. The natural layout of the region, its population, and extra-regional connections and relations similarly must be investigated with thoroughness, and the relations between these phenomena and the material works of man must be determined, if what has been called "an organized understanding of human occupance of a region" is to be obtained. The field investigator cannot, and the library investigator should not, see the material works of man divorced from the natural features occupied or otherwise involved. Neither should the investigator see these works of man divorced from the populations who make them, employ them, and are served by them. And either a field or a library investigator obtains only a partial understanding of human occupance of a region if extra-regional connections and relations are overlooked.

In employing such a check list as is here presented one should remember certain inherent limitations of the list. In the first place, it is illustrative of the kinds of phenomena to be investigated, but it is not an all-inclusive catalogue. In the second place, no such generalized list can indicate for a particular region which phenomena are important and which are insignificant, since each region possesses a unique total association of phenomena giving it individuality. In the third place, the list cannot be employed as a precise guide to the order in which particular phenomena or groups of phenomena are to be investigated. In field investigation one sees what he can where and when he can. One asks questions of the inhabitants when he can and about what they happen to know. In the library this fortuitous order is even more marked. The geographical investigator using the library is perforce restricted to the materials there available. Library materials, whether in the form of maps, statistical data, printed words, or photographs, are the results of selection and sorting by persons who were in most cases not geographers, and whose interests were very diverse. Furthermore, books and pamphlets in most libraries are widely scattered over the shelves according to a classification devised as though with malice aforethought to separate what deals with any particular region. In the fourth place, the arrangement of items in a check list should

never be permitted to dim the investigator's recognition of areal and time associations, and of time sequences, of phenomena. Thus, fields of crops occupy the valley floor flats of alluvial soil, whereas forests clothe the steeply sloping valley sides. Corn in the field nearby is being husked on a crisp day in October, whereas the seed was planted in May in silt loam soils which had only a short time before dried out sufficiently to be plowed. The freight train in the distance moving towards the city carries coal, whereas the train moving away carries steel girders. The very high-class residential district under observation is composed of fine houses with spacious grounds, and lies along the ravine dissected and wooded lakeshore bluffs, well out from the heart of the great city; the low-class residential district of shabby apartment buildings closely crowded between warehouses and factories, lies well in towards the heart of the city. The worker in the library, even more than the investigator in the field, must exercise care not to overlook such areal and time associations and time sequences. In short, the limitations of a check list are numerous, and no list can do away with the necessity for the exercise of initiative and judgment on the part of the observer. The purpose of the list is, in so far as is feasible, to introduce system and orderliness into observation and other methods of acquiring data, and to guard against the omission of important categories of data. Specifically, the list herewith presented is designed to facilitate the collection of an adequate body of data for the understanding of human occupancy of regions. The list obviously must be more or less altered to fit any other statement of objectives.

CHECK LIST FOR ANALYSIS OF HUMAN OCCUPANCE OF A REGION

- I. Inherent traits of characteristic individual operation units.
 - A. Function (purpose served).
 - B. Component parts and arrangement thereof.
 - C. Forms, dimensions, materials, color of component parts.
 - D. Fixity on a site or mobility.
- II. Pattern of distribution and areal extent of operation units, of component elements of these units, of groups of units.
 - A. Production units.
 1. Agriculture—farms, ranches, plantations, farmsteads, ranch centers, fields, pastures, crops, fences, wells, windmills, irrigation and drainage ditches, livestock, plows, harrows, wagons, other machinery and tools.
 2. Forest exploitation—logging "outfits," forest areas being cut, camps, dams, logging roads, log piles, horses, implement equipment.

3. Fishing and hunting—fishing grounds, piers, fish sheds, boats, nets, hunting grounds, camps, lines of traps, pit-falls.
4. Mineral exploitation—mines, quarries, pits, shafts, tunnels, ore piles, spoil dumps, power houses, loading sheds, camps.
5. Manufacturing—manufacturing establishments, buildings, machinery, power plants, yards, piles of raw materials, waste piles, deposits of finished products, settling ponds, docks.
6. Groups of units—areal associations of similar production units (localities, districts, subregions); degree of regional homogeneity in farming, ranching, hunting, logging, mining, and manufacturing.

B. Transportation units.

1. Railways—steam and electric railway and street car lines, main and branch lines, switch tracks, terminals, stations, yards, repair shops, coaling sheds, water tanks, power houses, car barns, bridges, tunnels, cuts, fills, portions of line with low, medium and steep grades, control signals; numbers and kinds of freight and passenger trains, trolley cars, steam or electric locomotives, size and types of cars, number of cars in train.
2. Roads and trails—main and secondary roads and trails, streets, bridges, culverts, cuts, fills, portions of roads, trails, or streets with low, medium, and steep grades, parking areas, bus terminals; numbers and kinds of automobile trucks, busses, private cars, wagons and carts pulled by draft animals, pack animals, human carriers.
3. Waterways—river, lake, canal, coastal, and oceanic waterways, main and secondary lines, portions of lines with different depths, shallow places, dredged stretches, rapids, locks, harbors, docks, piers, other landing places, loading and unloading equipment at landing places, passenger and freight sheds; numbers and kinds of ships, boats, barges, and rafts of various types and sizes, moved by wind, steam, motor, man, or current.
4. Airways—landing fields, hangars, runways, passenger and freight sheds, other buildings, beacons; numbers and kinds of airplanes, dirigibles.
5. Pipe lines, electric power transmission lines—pipe lines for oil, water, gas, wire lines for electric power transmission, pumping stations, tanks, electric power substations.
6. Telephone, telegraph, radio lines—wire transmission lines, underground conduits, underwater cables, telephone exchanges, broadcasting and receiving plants.
7. Groups of units—regional, sub-regional, district, and locality systems of each major class of transportation lines, and of combinations thereof.

C. Commercial units.

1. Wholesale establishments—produce markets, main and branch wholesale houses.
2. Retail establishments—for sale of various commodities or groups of commodities: grocery stores, drug stores, department stores; for sale of various services: banks, lawyers' offices, laundries.
3. Storage establishments—warehouses, cold storage warehouses, grain elevators, coal, lumber, sand and gravel yards.
4. Groups of commercial establishments, by localities, districts, subregions.

D. Habitation units.

1. Kinds of structures devoted in whole or in part to habitation.
Caves, tents, thatch huts, other types of simple structures of people with primitive or relatively low civilization, boats, log cabins, frame shacks, wood, brick, or stone cottages, bungalows, frame, brick, or stone houses of more than one story, apartment buildings of various types of construction and size.
2. Component elements of habitation—structures housing associated outbuildings, courtyards, gardens, other associated grounds, walls, fences, hedges, walks.
3. Groups of habitation units—areas of widely separated units, small groups of relatively spaced units (camps, hamlets, villages), residential districts in towns and cities (each district more or less homogeneous in kinds and spacing of buildings); degree of regional homogeneity in kinds and spacing of habitation units.

E. Recreation units.

1. Buildings devoted to indoor recreation.
Theaters, dance halls, skating rinks, gymnasiums, other large structures for games or other spectacles.
2. Outdoor recreation areas of comparatively small extent, in most cases serving crowds, and in most instances much modified from a natural state.
Playing grounds for athletic contests (baseball parks, athletic fields, golf courses), amusement parks, city parks, bathing beaches.
3. Extensive outdoor recreation areas.
Districts visited for hunting, fishing, enjoyment of scenery; resort hotels, summer cottages; trails.

F. Government, education, religion, and other units.

Legislative buildings, court houses, police stations, firehouses, army barracks; school units of various grades; churches.

- G. Groupings of areally and functionally associated operation units of several kinds—regional, sub-regional, district, locality.⁶

III. Construction, maintenance, and working of operation units.

A. Production units.

1. Agriculture—clearing land, constructing barns, houses, sheds, building and repairing fences, digging and cleaning out irrigation and drainage ditches, plowing, harrowing, seeding, transplanting, cultivating, irrigating, fertilizing, spraying, pruning, harvesting, feeding and otherwise handling livestock, preparing products for shipment.
2. Forest exploitation—estimating timber stands, establishing camps, building logging roads, building dams, clearing out streams for log drives, cutting trees, hauling logs, piling logs by streams or railways, driving logs down streams, loading logs onto railway cars.
3. Fishing and hunting—building piers, sheds, boats, repairing nets, going out to fishing grounds, setting and lifting nets, fishing with lines, trawls, and seines, cleaning, icing, salting, smoking fish; establishing camps, setting lines of traps, skinning animals, curing pelts.
4. Mineral exploitation—prospecting, opening mines, pits, quarries, and wells, working mines, preparing products shipment.
5. Manufacturing—preparation of land for factory site, construction of buildings, switches, docks, receipt of raw materials and fuel, transforming raw materials into finished products, disposal of wastes, packing and shipping finished products.

B. Transportation units.

1. Railways—preliminary location surveys, making cuts and fills, driving tunnels, building bridges, grading line, laying tracks, erecting stations, water tanks, coal sheds, and signals, repairing washouts, replacing rails and ties, painting bridges and buildings, removing snow; frequency of trains, speeds, stops, length of hauls, temporary interruptions in service, control systems.
2. Roads and trails—preliminary location surveys, making cuts and fills, building bridges and culverts, grading and surfacing roads, cutting trails through forest or brush, marking roads and trails, removing snow from roads, dragging surface of roads after rains; frequency, speeds,

⁶ For the present the author of this paper is unable systematically to elaborate to his satisfaction this part of the check list. Some of the problems involved in such an elaboration are stated at least inferentially in a subsequent section of this paper.

stops, length of hauls of various kinds of conveyances, temporary interruptions to traffic.

3. Waterways—dredging or digging channels or basins to appropriate depths and widths, clearing out logs or other obstructions, constructing locks, docks, piers, breakwaters, freight and passenger sheds, dredging out sediment, breaking ice; rates of speed, length of runs, frequency of stops, interruptions to traffic.
4. Airways—preliminary surveys, construction and maintenance of landing fields, hangars, freight and passenger sheds, and beacons, fog dispersal at landing fields; rates of speed, length of runs, stops, interruptions to traffic.
5. Pipe lines, electric power transmission lines—preliminary surveys, digging ditches and laying pipe lines therein, erecting power transmission lines, building pumping plants and power stations, repairing lines; operating lines, interruptions to operation.
6. Telephone, telegraph, and radio—preliminary surveys, erecting lines and other plant, laying conduits, repairing lines and plant; operating, interruptions.

C. Commercial, D. Habitation, E. Recreation, F. Government, education, religion, and other units (to be elaborated).

IV. Disposal of products or services of operation units and of groups of units.

A. Production units.

1. Output consumed or otherwise utilized by producers—kinds, qualities, quantities, time of year.
2. Output sold—locally, outside of locality but within region, to other regions.

B. Transportation units.

1. Commodities, passengers, messages carried by various units—kinds and amounts of commodities, numbers of passengers, amount of mail, number of telephone, telegraph, cable, and radio messages, periodic and aperiodic fluctuations thereof.
2. Areas served and transportation centers involved.
 - a. Source and destination areas of commodities, passengers, and messages carried.
 - b. Points at which goods or passengers are transferred from one line or mode of transportation to another.

C. Commercial units.

1. Commodities and services sold—kinds and amounts of commodities, kinds of services, numbers of people served, periodic and aperiodic fluctuations thereof.

2. Areas served and transportation connections therewith.
 - a. Source areas of commodities sold or stored and of people served, and transportation therefrom.
 - b. Market areas of commodities sold or stored, and transportation thereto.
- D. Habitation units.
 1. Quality (degree of luxury) of quarters afforded. A significant feature is upkeep of exterior of building and of grounds.
 2. Size of quarters—for individuals, couples, small families, large families.
 3. Population housing capacity per unit of ground area occupied by establishment.
 4. Permanency of occupancy afforded—transient, seasonal, a few years, many years.
- E. Recreation, and F. Other units (to be elaborated).
- V. Phenomena which account for present day (1) pattern of distribution, (2) areal extent, (3) operations involved in construction, maintenance, and working, (4) disposal of products or services, of operation units of a region.⁷
 - A. Population of the region—distribution and characteristics.
 1. Numbers.
 2. Areal density.
 3. Technological knowledge and skill.
 4. Energy.
 5. Social, economic, and political status and organization.
 6. Plans, tastes, superstitions, and beliefs.
 - B. Natural features of the region—distribution and characteristics.
 1. Land forms (surface configuration features).
 2. Soils.
 3. Surface water features.
 4. Ground water.
 5. Rocks and mineral deposits.
 6. Natural vegetation.
 7. Wild animal life.
 8. Climate.
 - C. Connections and relations between operation units.
 - D. Past stages in human occupance of the region—pattern of dis-

⁷ The fact that this section of the check list is much less fully elaborated than the preceding sections is not intended to indicate that the phenomena dealt with in this section are unimportant. A detailed and valuable elaboration of "V B" is presented in Siegfried Passarge: *Beschreibende Landschaftskunde*, 2nd edition, Hamburg, 1929.

tribution, areal extent, operations, disposal of products or services, of operation units.

E. Extra-regional connections and relations.

1. Transportation lines.
2. Commodity movements.
3. Population movements.
4. Political connections.

ANALYSIS OF INDIVIDUAL OPERATION UNITS

Field investigation of human occupancy of a region consists in no small degree of the study of individual operation units, with subsequent generalizations about groups of units. Various kinds of individual operation units are indicated in the preceding check list, such as those (1) for production of commodities—farms, ranches, plantations, logging or fishing “outfits,” mines, factories; (2) for transportation of commodities, passengers, messages, railway lines, bus lines, steamship lines, telephone lines; (3) for sale of commodities or services—banks, drug stores, wholesale grocery establishments, grain elevators; (4) for habitation—houses, apartment buildings; (5) for recreation—theaters, baseball parks, bathing beaches, golf clubs, hunting preserves, national parks; (6) for government—court houses, police stations, legislative buildings, military barracks; (7) for education—elementary schools, universities; (8) for religion—churches.

Each of these material works of man, which occupy area and which are functional (operation) units, can be analyzed according to the following scheme, which by repeating points taken from the preceding check list directs attention to (a) inherent traits or characteristics of the unit, which traits give individuality to the unit, make possible its recognition, and are significant in understanding its occupancy of a particular site, and (b) phenomena which in association explain the characteristics of the unit and its occupancy of a particular site.

1. Function—purpose served.
2. Forms, dimensions, materials, colors, arrangement of component parts.
3. Operations involved in construction, maintenance, working or using the unit.
4. Disposal of output of products or services.
5. Population involved in operation and in disposal of output.
6. Natural features of the site occupied.
7. External connections and relations involved in operations and in disposal of output (both within and without the region in which the unit under study is located).

8. Past stages in occupance of the site.
9. Future probable or desirable changes in the character of occupance of the site.

THE PRELIMINARY REGIONAL RECONNAISSANCE

The preliminary reconnaissance, designed to give the investigator a quick broad view of the area which he subsequently is to study in more detail, is invaluable in either field or library work. It fills the trained and alert observer full to overflowing with ideas. It gives him a preliminary blocking out of the region into subdivisions, and some organized idea of the outstanding features of the region, including the predominant kinds of operation units. It makes possible tentative selections of sample localities in which presently detailed work may be done. It raises a host of problems to be solved.

As yet the preliminary field reconnaissance as practiced by geographers is much less standardized in methodology than is the more detailed work which follows. In essence, however, it consists of running a few traverses across the region, the spaces between the traverses being left for subsequent filling in. At appropriate places along these traverses stops are made to make more detailed and careful observations than are possible when the investigator is on the move. The airplane has in recent years greatly increased the possibilities of the preliminary field reconnaissance, and active experimentation in airplane reconnaissance methods is in progress.

In general as to the methodology of preliminary reconnaissance, both in the field and in the library, the writer of this paper is of the opinion that much experimental work needs to be done, and that efforts along this line will yield rich returns.

DETAILED INVESTIGATION OF SMALL SAMPLE AREAS

The value of detailed investigation of well selected small areas in the study of extensive regions has been thoroughly established. For obvious reasons the detailed coverage of extensive region is in most cases impracticable. By means of a second reconnaissance, however, which *follows* the detailed study of selected small areas, it is possible to determine with a rather high degree of accuracy the extent of the larger territories over which spread the associations that were found in the small areas. Particularly is the determination of the spread of associated diagnostic phenomena of areal occupance over extensive regions facilitated by the employment of isopleth maps based on census data by small administrative units, such as counties (even better by townships).⁸ The methodology of investigating

⁸ The same sorts of isopleth maps serve as an efficient supplement to preliminary reconnaissance in the selection of characteristic sample localities for detailed studies.

small sample rural areas is well developed and need not here be elaborated. Correspondingly effective methods for urban investigation have largely yet to be worked out.

THE MAP AS A FORM OF RECORD AND AS A TOOL IN ANALYSIS

Recording of observations is an essential part of every scientific investigation. Of the various forms of record employed by geographers—written statements, tables of data, diagrams and graphs of many kinds, photographs, and maps—the map ranks first as a device for showing the areal extent and pattern of distribution of phenomena. The techniques of map record have been highly developed, but there still is room in this field for further experimentation. Particularly is this the case with maps designed to depict associations or complexes of two or more different phenomena.

In analyzing the associations of data with which they are concerned, and in finding relations between phenomena, geographers have in the past largely employed simple maps, each of which showed the distribution of a single kind of fact. More and more, however, maps are being constructed which show the distribution of several kinds of associated facts. Such maps are especially useful in facilitating the determination of the existence or absence of coincidence in areal distribution of two or more kinds of phenomena. Since the determination of the existence or absence of areal coincidences in distribution is of peculiar interest and significance in geographical investigation, the development of types of maps which further such determinations is greatly to be desired.

Many kinds of coincidences in areal distribution and in time occurrence, as well as numerous time sequences, must be investigated by the geographer concerned with regions. Various methods of statistical analysis undoubtedly can be utilized in such investigations, and are beginning so to be utilized by geographers. Such statistical correlations do not supplant the map, however, but rather greatly increase its range of usefulness.

THE DETERMINATION OF AREAS OF HOMOGENEITY

Most geographers agree that one of the major objectives in regional investigation is the determination of areas of various magnitudes that display significant homogeneity. The determination of such areas constitutes a kind of scientific generalizing, and is not, as sometimes has been said, "merely a pedagogical device to facilitate the presentation of geographical material to classes of students." Much work has been done along this line of generalizing, but much more remains to be done, for the problem is highly complicated.

The determination of areas of homogeneity inevitably must come late in

an investigation. Only after an ample and sound body of data has been gathered, and the significant relations between various categories of data have been ascertained, can the important or essential homogeneities of areas be determined. And only after such homogeneities have been established can boundaries of areas of homogeneity be drawn with any approach to precision.

Various criteria have been employed as the basis for distinguishing areas of homogeneity. In general, there is at least the implied assumption that homogeneity in a few associated phenomena of importance is indicative of homogeneity in a more complex association in which the few selected phenomena constitute basic elements. Regional investigation focused on human occupance quite naturally leads to the determination of areas which display homogeneity in important occupance features. The dominant (from the standpoint of population support) kind of production occupance perhaps constitutes the most satisfactory basis for the recognition of extensive unit occupance regions. Sub-regional, district, or locality unit areas may be recognized on the basis of (1) associated secondary (from the standpoint of population support) kinds of production occupance, (2) minor variations in the character of the dominant kind of production occupance, (3) the existence of areas quite different in production occupance from the extensive region of which they constitute comparatively small parts, or (4) other associated kinds of occupance than for the production of commodities.

The determination of regional, sub-regional, district, and locality boundaries is a perplexing problem because in so many cases one "essential homogeneity" gradually gives way to another with no sharp line separating the two. This problem is solved by some geographers, notably the French, by refusing to draw boundaries. This solution is, in the opinion of the writer of this paper, no solution at all—it merely is begging the question. Admitting that almost any boundary line is in a sense arbitrary, and that between the "hearts" of unit areas there are in most cases transitional zones, it seems nevertheless highly desirable to draw definite boundary lines. In every case, however, the basis on which the line is drawn should be stated precisely.

Within essentially every unit area—region, sub-region, district, or locality—there is more or less areal diversity in spite of essential or significant homogeneity. Recognition of such areal diversity is an important part of regional investigation. The degree to which the investigator pursues the determination of areal diversity within areal homogeneity is largely a matter of the "scale" of the investigation, using the word "scale" in the sense in which it is applied to maps.

In conclusion of this brief statement on areas of homogeneity, it may be said that the homogeneity of larger areas consists in many, if not most, cases of repetition of a particular kind of heterogeneity which characterizes a multitude of small areas. Thus, in a large region most of the farms may be very similar, although within each farm there is much variety. Finally, emphasis should be put on the fact that many extensive areas which may be unified from the viewpoint of functional organization do not necessarily coincide with the more striking landscape units. Thus within the extensive area commercially tributary to a large city there commonly are several areas which differ markedly in production occupation.

NEED FOR BIBLIOGRAPHY ON PROCEDURES AND TECHNIQUES IN
REGIONAL INVESTIGATION

There is at present not available, at least in English, any comprehensive bibliography of articles and books on procedures and techniques in regional investigation. Furthermore, few published areal studies contain specific statements as to procedures and techniques employed in the investigations. It would be a real service to geographers, therefore, if someone would prepare an annotated bibliography on the subject. With such a guide available the process of bringing about desirable standardization in regional investigation as pursued by geographers might be speeded up materially.

*University of Chicago,
February, 1934.*

Dodge, Stanley D.—[Instead of launching the discussion of the foregoing paper with extemporaneous remarks, Mr. Dodge read a paper, which is printed herewith in slightly abridged form.—*Ed.*]

We have learned rather well how to collect material, but we have not learned what to do with it after it has been collected. The procedure which I shall stress has to do not only with the important question of analysis,¹ but also with what is equally important, the steps in geographical synthesis. What are we to do with the material collected in the field and elsewhere? I want to discuss this point briefly under three heads: (1) analysis, (2) synthesis, and (3) interpretation.

(1) I am of the opinion that geographical analysis consists in the separate, accurate cartographical representation of the ultimate elements of the landscape. What the elements are I shall not discuss here, but I believe that for analytical purposes the subdivision should be as fine as possible.

¹ See Johnson, D. W., "The geographic prospect," *Annals Ass'n. Am. Geogr.*, 1929, 167-231.

Thus I should want, among others, a separate map showing the distribution of houses of various kinds, maps of other buildings of various kinds, and one showing all kinds of roads. The maps may or may not form a part of the final published report, but they are, I think, an indispensable part of geographical analysis. I should want also as accurate and as analytically detailed maps as I could find or make of the various non-human elements of the area being studied. Thus it would be necessary to have a map showing the distribution of soils in detail, of landforms in detail (an accurate topographic map is often sufficient²), of water bodies in detail, and so on.

Having subdivided the elements of the complex as minutely as is probably necessary, we are now ready for actual analysis. This consists in comparing the maps with each other and noting coincidences and correspondences. Thus, it might be found by a comparison of the map showing distribution of classes of barns with that showing the distribution of soils, that there was a close agreement. The sole criterion is that there be agreement enough to suggest actual connection. Then, a reasoned consideration of the problem should make it clear to one familiar with the area whether or not the coincidence or correspondence were logical or not. If the connection appear logical, then a synthesis of these two elements is possible; it means that together, or with the association of other elements, they form a tissue running through the area. Judgments as to the relevance or irrelevance of data may change as investigation advances; the mind must remain open to the possibility of the inclusion of data, at first deemed unimportant, even to the extent of requiring additional investigation in the field. Analysis consists primarily in this close scrutiny of the elements of the landscape as a preliminary to the recognition of these partial syntheses.

(2) As fast as partial syntheses are recognized, they too should be mapped. We may then proceed to the recognition of syntheses of a higher order, likewise to be scrutinized analytically, and likewise to be recorded cartographically.³ The method may be repeated till the ultimate regional synthesis is achieved. This, I take it, is one of the major goals of geography.

The possibility of finding satisfactory syntheses is greater if connections are looked for among those separate data which, on theoretical grounds, may show functional unity. This may be illustrated by reference to possi-

² Many topographic maps themselves represent partial syntheses, as DeGeer has pointed out. See below.

³ The present synthetic "tissues" may be better understood if viewed as developments from the past; the question of sequent occupance comes in.

ble studies of human facts on the surface of the earth. The coal mine, the iron mine, the rail or water route, the steel factory, the highway net leading to the consuming centers, all these are functionally linked. Again, the pasture, the lane leading from the pasture to the barn, the barn itself, the farm storehouse for milk, the road leading to the creamery, the rail and highway net leading to the consuming center—all these might form a functional unit in the study of certain kinds of dairy regions. I am not forgetting, in the first case, the iron or coal that flows from the mine to the factory and, in a metamorphosed state, beyond to the consuming centers, nor, in the second case, the cows which supply the milk or the milk itself, with its possible transformation into butter, cream, or cheese, on its way to the ultimate consumer. Such functional units must be traced out cartographically, the areal spread must be recorded for each item in the functional chain, and thus for the system as a whole. The paths, trails, roads, railroads, canals, and other routes of travel, I hold to be of great importance as the functional skeleton of the elements of human geography, cartographically expressed.

The map is the instrument *sine qua non* in geographical methodology, but in the mapping of analyzed elements and of syntheses, the utmost possible accuracy should be employed. Roughly drawn sketch maps may be used as an aid in the synthetic process, but they are merely aids and not the final production; they are the shorthand of geographical methodology.

(3) So far I have dealt with analysis and with synthesis; what is meant by interpretation? The only scientifically valid meaning that I can find is this: Interpretation is an aid to the recognition of higher and higher syntheses. The synthetic process in geography can be applied more easily as the individual investigator is better informed in the specialties which form a part of geography as a whole, or which impinge upon it, but which treat their subject-matter more from the point of view of natural science or history than from that of geographic or areal knowledge. Hence the need for familiarity with the investigational methods of neighboring and kindred sciences is great, not that the geographer should become a specialist in them, but that he should be able to appreciate their geographical significance.*

Smith, Guy-Harold.—I am very glad that both speakers left open in considering methodology the opportunity to do as one pleases. That is not specifically stated in Mr. Jones' paper but is implied. A real contribution may come from some one who goes off by himself and does as he wishes.

* This point is covered effectively in the article by Johnson referred to in footnote 1. It is probable that the word "interpretation" should be relegated to the background of the geographer's vocabulary.

The check-list might well be used at the end of the investigation to make sure that important matters have not been overlooked. Let not a formal check-list stifle genius.

Brown, R. H.—One or two notes. It would be easier to discuss the manner of procedure if workers would say how they had gone about their task. They may omit a statement of technique, feeling the reader may lack interest in it or comprehension of it, or perhaps because they feel that the reader himself can determine, after having studied the published material, how that material was gathered. As to preparing the bibliography, I do not think that is sufficient. Not only should there be a bibliography, but an interpretation of the bibliography with various procedures which have been undertaken. Finally, little was said about the interpretation, the last stage in the procedure. I feel that a mere description is not sufficient, but that one should devote considerable time and space frankly to the matter of interpretation apart from description.

Dodge, R. E.—(1) We geographers err in the idea that mere coincidences are necessarily related. We see two things and suggest that they are related. Early in my training Shaler quoted to us the old canon of logic: "Two things that vary together are either causally related or they are both the result of a common cause."

(2) Geographers, particularly in the interpretation of rural areas, often go beyond their abilities in trying to map things they see. I have been in touch with the extension work in agricultural colleges sufficiently to know that what you see in any one year on many farms, especially in dairying communities, is not necessarily what you will see in crop distribution next year. The farm economist's problem is to work out plans whereby a man can make more profit next year than last and to encourage him to adopt crop distribution and farm practices that will give him that profit. When a geographer goes out and tries to analyze detailed crop distributions which are based on "man-work" units and to be followed for perhaps only one year, he is dealing with matters which are temporary and for the complete analysis of which he has not adequate basal information. So far as I know, some of the best methodology in the study of land use has come from farm economists in agricultural colleges. The best that geographers can do is to divide rural land areas according to permanent use, as, for instance, tilled crop land, permanent pastures, permanent hay land, orchards, waste land, land used for buildings, roads and other conveniences, without dividing crop land in detail according to the crop seen. This is certainly true in all cases of diversified farming.

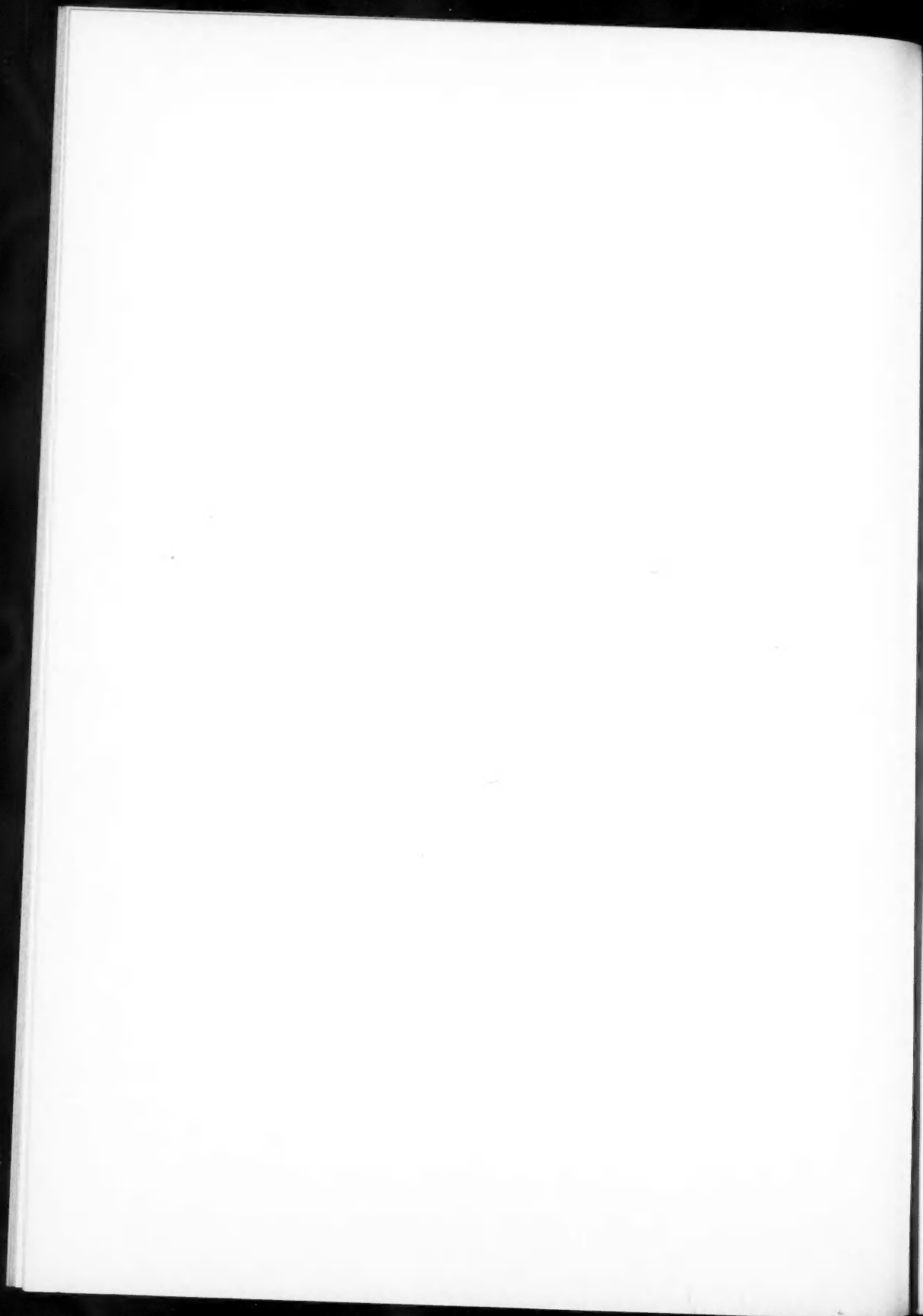
Dodge, S. D.—I take exception to the statement that geographers should do as they please. Some system of procedure is essential. Other-

wise, the results are incomprehensible. One investigator will proceed in an entirely different way from another. We must know that the *methods* by which results are achieved are satisfactory and comparable.

As to the question of interpretation raised by Mr. Brown, he and I see interpretation from two different angles. By interpretation I mean the ability to visualize the newspaper photograph from its component dots. It is an aid to higher synthesis.

Hall, R. B.—I agree with Mr. R. E. Dodge that there is a danger in the basis of interpretation, because of the many year to year changes. Furthermore, it is extremely unfortunate that colleges all have their vacations at the same time, so that all of the field work is being done at the same season. Our knowledge is almost entirely that of the summer landscape. We should consider the landscape changes as they occur in the cycle of seasons.

Trewartha, G. T.—There are two kinds of geographic facts, primary and secondary. Primary geographic facts are the *observable features of areas* and it is of these that a useful check-list can be made. Secondary geographic facts are those used to explain the forms, patterns and associations of the observable features. Since there is no limit to what the explanatory facts may be, it is quite impossible as well as unnecessary, to make a check-list of them. Prof. Jones' check-list is somewhat confusing because it does not distinguish between primary and secondary geographic facts.



Written Structures for Presenting the Geography of Regions*

V. C. FINCH

The title given for this paper advisedly is phrased in the plural form. There is no one most effective structure for presenting the geographical facts and philosophy relating to all portions of the earth's surface; no single mold into which the complex organisms of all geographical regions may be dropped and expected to fit. This pronouncement need not end the discussion, for, although there may not be any one structure adaptable to all uses, there should not be an endless array of structures from which the regional geographer may choose. If there were so great a number the prospective author in searching the pigeon-holes of an infinite series might well become confused or wearied with the multiplicity of choice and select unwisely as often as wisely. There could be no clearly-recognized guiding principle behind his selection.

If it is possible to achieve such an end, geographers need opportunity for a choice of structure for the vehicles of their expression but choice within a restricted and well-recognized range. This is true for several reasons. It is assumed that a science of regional geography can rest upon no other foundation than the conviction that the observable phenomena of inhabited earth ultimately shall be capable of analysis and classification. If this conviction is falsely founded then regional geography is not a field of science but an art which employs descriptive, depictive and interpretative phrases for their informative value or their literary effect or both. We may express the hope that the written structures employed in presenting the geography of regions may have both informative value and such quality as may demonstrate that geographers are at least moderately literate. But, beyond that, they should embody the basis of true scientific quality.

The structures of papers in scientific regional geography should be so articulated that the regions they present are capable of comparative analysis. To the unlearned soldier, familiar as he may be with dead men's bones and the sight of decaying horse-flesh, the heel of a man and the hock of a horse have no significant connection. There is in his mind no structural

*The third of three correlated papers on CONVENTIONALIZING GEOGRAPHIC INVESTIGATION AND PRESENTATION. (See p. 77.)

basis of comparison that serves to bridge the gap between the individual and the group, or to turn confusion into comprehension. Only through a study of the comparison of geographic forms, patterns and associations shall we arrive at anything approaching a scientific regional geography of the world. However, no effective comparison is possible unless the papers that are written in the field of regional geography are cast in molds whose forms are known and whose parts are capable of being arranged in an understandable order so that the items of studies cast in the same mold or even in different molds may be set beside one another and the degree of their accordance or discordance discovered.

If it is true that no single structure will suffice for an adequate presentation of the wide array of situations encountered in regional description and interpretation, what, then, is the smallest number of standard structures that can be devised to cover the requirements of the field? My answer to that question is "four." It is not intended by this statement to imply that any two regional studies built upon one of these standard structures will list facts of the same anatomical significance in the same identical order down to the last and least subdivision of the outline, or that it shall employ the same phraseology with a mere substitution of names and numbers. It is intended that the major elements of regional structure, at least, shall be present and discoverable and that conspicuous absences shall be noted. It is hoped that, with a simple set of structures in the foreground, many papers now written by geographers in the border fields of geomorphology, climatology, ecology and anthropology more commonly may be bent to a description and interpretation of the areas they concern rather than merely of the land forms, agricultural crops, or the social and industrial developments of the peoples therein. That would result in a great advancement of the understanding of the regions of the world.

What are the four patterns of structure that may be adequate to the presentation of the geography of all kinds of regions? The answer to that question quite clearly involves some comment upon the nature and manner of delimiting, even if one does not feel competent to attempt a definition of, a geographical region. A geographical region, or even an arbitrarily-chosen portion of the earth's surface, may be thought of as having some of the qualities of a human being. It is a thing both physical and cultural, not wholly physical, not wholly cultural, but with physical and cultural elements so interwoven as to give individualism to the organism. Like human beings, geographical regions do not always exhibit a nice balance in the development of both sides of their natures. Just as the savage man is dominantly a physical creature, his cultural nature yet to be developed, so some regions of sparse or recent human occupancy remain dominantly natural.

At the opposite human extreme is the true esthete in whom the instincts of savage man are almost completely subordinated to a set of highly cultivated values, aspirations and inhibitions. Some regions are like him, particularly some urban regions. In them natural earth has been all but obliterated, hills cut down, valleys filled, drainage reversed and soils remade or buried under vast expanses of construction and pavements. Even the rigors of primeval climate are to a great degree offset, if not overcome, and the populace lives and works with but little thought of the natural forces to which, in other regions, they would need to shape the manner of their existence. Between the two extremes in human culture are the great majority of mankind. Growing esthetic values struggle with natural instincts. Primitive and outmoded standards survive in great number amid the ideas of newer thought and culture and all too frequently dominate the activity of the masses of people. In some societies these old values are retained with great tenacity because their roots are sunk deep into a long past. In others, where the ties and trends of history have been broken, the old is more easily exchanged for the new. So it is with the greater part of the geographical regions of the world. Natural forms combine with cultural forms and are fused into patterns and associations, and have functions that give individualism to a region. In some regions the cultural forms, the regional patterns and the associations, both intra-regional and inter-regional, are but newly developed, and all are explainable in terms of present human institutions. In others, neither the cultural forms nor the regional patterns and associations are explainable except in terms of a long and complicated succession of human cultures that have passed through stages of evolution and involution in the area.

Against this background of belief concerning the nature of geographical regions there may be set up as structures for presenting them four standard forms. They are: (1) a structure that will permit the presentation, in shape for ready comparison, of a description and interpretation of the forms, patterns and associations of *regions whose landscapes are dominated by the features of natural earth*; (2) a comparable structure adapted for use with *regions whose landscapes are dominated by forms of human culture*; (3) a structure suited to presenting the geography of *regions in which landscape forms of human culture and those of natural earth are associated in abundance*; (4) a structure modified from the preceding to make it appropriate for use with *regions of the same sort which are further complicated by the presence of relict forms resulting from a long or rich sequence of human cultures*. It is recognized that, in practice, few if any regions fall clearly within the exact definition of any one of these four classes. Most of them are border-line or intermediate types. A

recognition of standard types may, however, serve to facilitate the classification of problems faced and to suggest means of combining or modifying the structures proposed for their presentation. We may now examine briefly the component parts and the internal arrangements of the types of structures that have been advocated.

Examples of good presentation of regional studies of primeval areas are not abundant. Such studies of uninhabited, or sparsely inhabited, areas as exist usually are studies of geomorphology simply or of climatology and land forms, and are not well-rounded regional studies of all the aspects of natural earth. A few others, like Sauer's *Site and Culture at San Fernando de Velicatá*, picture an almost uninhabited region but with an important sequence of antecedent cultures. Perhaps the best English examples of structures employed in covering regions where natural earth is dominant are found in Special Publication No. 8 of the American Geographical Society, "The Geography of the Polar Regions," in which the distinctly geographical treatment of the Antarctic by Ludwig Mecking deserves particular commendation.

Regardless of the number or perfection of the examples of this type of writing one may be bold enough to sketch in broad outline what such a structure should contain and to state by way of contrast some of the things it should not contain. The customary "geographical" introduction to a geological report or bulletin in which a paragraph or section of encyclopaedic comment is devoted to the standard topics, location, area, surface-features, drainage, climate, vegetation and soils, is by all means to be avoided. That is a cold and spiritless way of looking at the vital association of natural forms that comprise the fundament of landscape.

It is a hard task to say just what a truly geographical treatment of natural earth should contain and just how the material should be organized. Certainly the principal themes should be *form*, *pattern*, and *association*, and the principal method *description*. Let it be explanatory description, certainly, but first description. How else shall we convey the picture of a geographical region or preserve it for future comparison?

What shall be described? First, *forms*; land forms, observable climatic phenomena, drainage conditions, soil character, earth resources, the character of vegetation and other items, all the components of natural earth with which geographers are so familiar. Second, *pattern*; that is, forms in their characteristic areal arrangements, drainage pattern, land form arrangement, vegetation pattern and others. Third, *association*; drainage form and pattern in their physical relation to land form and pattern, or vegetation pattern in its relation to land-form, drainage and soil patterns. It is by no means meant to imply that these are subjects for entirely separate treat-

ment, each a matter apart. Quite the contrary. The experienced writer may find ways to weave together the pictures of form, pattern and association and create therefrom a mosaic of living color in which, however, the seeker for details of form or pattern may find a wealth of explicit information about any of the component elements of natural earth.

Explanation or interpretation of the forms, patterns and associations that comprise the natural features of a region is clearly a vital part of a geographer's task. It is not my belief that the treatment necessarily loses geographic quality if it fails to interpret. Good description is, in itself, a worthy geographical end, provided the writer, after serious attempt, is unable to interpret. Explanation, in the field of earth phenomena, involves known dangers for the geographer. The field is broad and the range of subjects that may be introduced by way of explanation extends into other sciences. One can hardly follow all the way with Davis when, in his *Erklärende Beschreibung der Landformen*, he says: "... it is unquestionable that so far as anticlines and synclines and the hard and soft rocks are now observable as the ranges of the Jura they are just as truly geographical features as the ridges and valleys of which they are the cause." A clear recognition of the primary geographical quality of the observable phenomena of landscape and of the secondary quality of the deduced facts required for their interpretation may well serve to limit and guide the experienced writer.

What, then, is to be said of the structure required for presenting the geography of a region whose landscape is dominated by forms of human culture? It is built upon the same fundamental conception as that required for regions in which the forms of natural earth are dominant. The principal themes are, as before, form, pattern and association and the method again is explanatory description. However, the forms, patterns and associations are essentially different from those of the preceding group. The element of association takes on an external as well as an internal significance. Also a new element, *function*, is added. These changes require some structural alterations in the vehicle of presentation. There clearly is choice to be made in the matter of whether to begin the treatment with a description of the primeval site and its situation and to evolve thereon the existing forms, patterns, associations and functions, or to begin with the present landscape. For the somewhat hypothetical, but perfectly possible, case I have chosen, *i.e.*, complete dominance of the cultural landscape, my choice would favor the latter procedure. I would begin with the present landscape which, in this case, could not possibly be other than an urban landscape. Even this decision leaves room for choice, for we have the alternatives of starting the description forthwith or of using the urban functions

to motivate the descriptive treatment. These alternatives both have merits for particular cases. I hold no brief for either. However, I would begin with the present landscape and proceed upon a structure that would require description. It would include description of the urban pattern, including the street plan and the plans of other transportational forms. There would be description of the urban forms, including the structures of commercial, manufactural and residential significance. Description should also cover the existing associations of forms and patterns, such as the grouping of residential classes, types of commercial, manufactural or other uses of area with reference to street or other patterns. In all this comment on the visible aspects of landscape, which will be of the nature of explanatory description, the interpretative function of geographical writing will have been fully exercised, both as to intra-regional and inter-regional relationships. Thus, in the end, the city will have been pictured as evolving from a set of conditions and resting upon a site now completely altered. I am aware that this order of procedure is the reverse of that employed by Prof. Raoul Blanchard. The structure outlined above has, however, at least equal merit. It puts to the fore that aspect of the subject upon which the writer speaks with authority; the present city. It puts in its proper place that body of deductions about the past which, however well they may have been developed by a rigorous historical method, still are deductions. A century hence the recorded observations of landscape may be worth much, the deductions little.

We may turn now to the third standard structure which is designed to present the geography of a region, let us say a pioneer region, in which natural and cultural forms are associated in abundance but without a sequence of antecedent cultures. After the barest of locative statements we turn again to the matter of how the area looks. That seems of vastly greater geographic moment than its boundaries or its problems. I may repeat my conviction that it is the subject of most enduring value in geographical writing.

The organization of this explanatory description of the area involves matters of literary taste as well as clarity of statement. Some will prefer first to describe the forms and patterns of natural earth and follow with the superimposed forms and patterns of human culture. Others may prefer to sketch the cultural aspects of the area and subsequently to build the natural forms as a background for them. It has appealed to me that there is a greater challenge to ingenuity in geographical expression in attempting to do both at once. That is, to interweave the descriptions of natural and cultural as they are interwoven in the area. The compartmentalization of facts upon a topical basis is thus avoided and a regional mosaic is substi-

tuted for it. Some may question whether this treatment permits of complete description of any one aspect of a region. I may question in return whether any regional description is ever complete. However, it is surprising what a range and detail of questions concerning both the natural and cultural forms in an area may be answered from well-compounded writing of the interwoven type. Interwoven interpretative description of all the elements of the areal scene rather than serial description of each element, with a subsequent interpretation, is the more difficult task, but if it is well done it is a product of higher literary merit.

Having made alive the landscape of the whole area the geographer is next faced with the task of subdividing it into component localities upon a satisfactory basis. The nature of that basis is at the moment of no vital concern to me. Ultimately we may know how to synthesize portions of the earth's surface in terms of all their characteristics. At present we do not, and I am willing to be satisfied if, having set apart an area on the basis of significant internal unity and external disunity in terms of *at least one* component of landscape, the author proceeds with an adequate explanatory description or, if he can do no better, simple description, of the content of his chosen unit. Too much of the world yet awaits any kind of description by the pen of a person trained to see in terms of landscape form, pattern and association for us to insist that description wait until explanation is available.

We arrive now at the last, and certainly much the most common, of the four standard regional types originally recognized. It is the area in which natural and cultural features are abundantly associated and their interpretation complicated by the presence of relict forms. A structure suitable for presenting such a region has the same fundamental requirements as the foregoing. The most effective approach to an understanding of the area will include a general view of the present landscape. This is equally true whether the area be rural or urban. Even in the general picture it will develop, however, that there are forms or patterns that, from the modern viewpoint, are anomalous. An adequate interpretation of such features may well require the introduction of two new elements in the structure of presentation. They are (1) provision for a revisualization of previous landscapes, and (2) provision for the introduction of the regional activities and the inter-regional relationships of an earlier day, in terms of which alone the relict forms of the modern landscape can be understood. The purpose to interpret the areal scene may indeed require the re-creation of the primeval landscape and those of subsequent periods. If records are complete and the observations of the earlier writers and cartographers trustworthy this may be done with adequacy. The treatment may also re-

quire the introduction of peoples that have appeared and disappeared, of industries that have risen and fallen, of laws long since repealed. It may further require the reconstruction of former social ideas and customs, and the imputation of past purposes which, despite the admitted effectiveness of modern historical method, must still remain matters of deduction and not of observation. They have their rightful place in *the interpretation of the present areal scene* and so long as they are required for that fundamental purpose I shall be the last to regard them as extraneous materials. In a sense, they are asides and the written structure may well provide for them to be expressed in that manner.

A writer imbued with the purpose to describe and, so far as he is able, interpret the present areal scene; who is conscious of the need for inter-regional comparability in the structures of his presentation; who is conscious of the existence of primary and secondary quality in the nature of his materials can hardly go far astray. Whatever materials he may introduce by way of interpretation will assume their proper place in the composition and in the end he will bring his reader to the principal matter in hand, a broadly enlightened description of the area of his choice; the one matter on which he can be positive and as detailed as his space permits; the one aspect of his work that time and the opinions of others can never challenge.

*University of Wisconsin,
December, 1933.*

Dicken, S. N.—Mr. Finch's paper suggests several questions for additional discussion:

1. How can we define and delimit geographic data, not merely in theory but in practice? Is it feasible to accept the occurrence of observable phenomena in the landscape as the criterion?

2. To what extent is explanatory description necessary? Some geographers consider explanation, such as the genesis of land forms, unnecessary. Perhaps this is a natural reaction to some geographic treatises which explain at length but describe inadequately. Can we agree that explanation should be subordinated to description?

3. What is the importance of function in the depiction of certain cultural forms such as those found in urban landscapes? Function, to be sure, belongs in a geographic discussion but not merely as a substitute for description. If we accept the definition of geography as the study of landscape phenomena we cannot portray cultural forms by merely stating their function.

4. Does the historical method, widely acclaimed by various investi-

gators, offer only advantages to the geographer? Or has it led, in some cases, to the emphasis of the historical aspects and the neglect of adequate regional treatment?

5. How valuable is the interwoven description of the natural and cultural forms as a means of presenting a regional study? Is there not the danger of giving the associated concepts the appearance of causal relationships when they are merely coincidental? Perhaps the decision on this point must await additional examples of such description.

6. Are the four types of regional study suggested by Mr. Finch of more value in attacking a regional problem or in working out the structure and form of a geographic paper? The difference in presentation lies in the estimated relative importance of the natural and cultural features. Which of the four types will be chosen depends not only on the quality of the region but also on the training and inclination of the individual geographer.

Mr. Finch, will you tell us a little more fully how these four types will aid the individual geographer in depicting and presenting a regional geographic study?

Finch, V. C.—My purpose is not so say, "here are four set structures to which a paper must be fitted," but to suggest the order of the differences in the sorts of phenomena which one encounters. There should be some standard sorts of forms. The inexperienced writer may then say, "The problem I am facing is a little more like this one or that one." He may have done this subconsciously before. However, most of us who are guiding the preparation of theses know that the student often is puzzled to know just how to organize the problem he has in mind when he begins to put it in shape. My sole thought was to have some sort of guide set up with which he might compare his problem—as a piece of cloth may be compared with a color chart. Not that one wishes to adopt the color shown in the chart, but only that he may be sure of the color of his cloth.

Brown, R. H.—In an area dominated by cultural landscape, would primary description include the elements of the natural landscape?

Hartshorne, R.—You have given these types as guiding principles in describing a region. Should one put the four types together mathematically and generalize? Whether the landscape happens to be a product of nature or a product of man, one starts always with the present landscape. Is not your rule then a single rule?

Finch, V. C.—To Mr. Brown's question, "Yes." If anything is left of the natural landscape, it must enter into the present landscape and be described.

To Mr. Hartshorne's question, "Yes." I have no objection to putting the four together provided you take them apart again to analyze them.

Colby, C. C.—It seems to me that in these papers we are fulfilling the purpose of the founders of the Association. We are getting together to discuss matters of moment in geography. None of us would contradict the contention that regional geography is a matter of moment at the present time. We are under deep obligation to the people who have arranged this program and prepared these papers. I share enthusiasm in all that has been said. Nevertheless, I do not recall a series of papers with which I have found myself in such complete and delightful disagreement.

I wish to bring out that I should not say: "How the area *looks*." I should rather say: "How the area *is*." Two regions may *look* alike but they may *be* quite different. In this set-up for regional work, I would agree to start with the present. I might or might not want to start with the landscape. I believe that there is much of value in an area that you cannot see. Mr. R. E. Dodge brought that out, and Mr. Hall again. I agree with them. It seems to me in this set-up we must provide for a difference in emphasis. I shall want to read these papers and check them against my working program. When that is done, it may be that much of my disagreement will vanish. Here is a suggestion: we might treat this session as a beginning. Later on we might have a conference on regional geography in which those of us who disagree with these papers might have an opportunity to state our case. Perhaps then we should be able to bring forward a more comprehensive point of view than any one of us has at present.

Finch, V. C.—The question "how the region *is*" is all right, but it involves subjective ideas. You *see* only things which are objective. The things one cannot see must be put into the description, but we must proceed from a basis of observable facts.

Jones, W. D.—Your interpretation and mine may be different but equally good. There is much common ground. On this common ground there are certain procedures which I tried to talk about. After the investigation comes interpretation. There is a common problem for the advocate of "control," "influence," "relationships," "adjustment," or "landscape." The problem is one of presenting what has been found out. What are your conclusions irrespective of your philosophy? There are certain common problems. The problem is how to say a lot of things all at once. They all occur together in an inextricable compound, but one cannot talk about them all at once. They must be presented one after another.

Inselbergs

BAILEY WILLIS

An inselberg in the strict sense in which the term is used in this article is an isolated hill or group of hills rising abruptly from a peneplain, as an island rises from the sea. The type was first described by Bornhardt¹ and the definition should properly be narrowed to accord with the facts in the area where he observed the peculiar, typical occurrences. The rock is important. Taking account of it the definition would run: An inselberg is an isolated hill, which rises abruptly from a peneplain and consists of massive granite, or quartz-rich gneiss and schist intruded by granite. This excludes volcanic necks, which nevertheless are related forms.

The region in which Bornhardt made his observations is part of the piedmont belt of East Africa lying wholly in the tropics and between the coastal plain and the escarpment which defines the much higher plateau. In terms of political geography it is now best indicated as the southeastern part of Tanganyika territory. Lindi was the port from which he set out. He first crossed a narrow zone of Tertiary strata, passed through a wider belt of relatively high mesas of Lower Cretaceous formations by following up the valley of the Lukuledi River, and came out upon an endless plain, carved upon Pre-Cambrian gneiss and granite. The landscape, which astounded him, is best described by translating his own words:

"We now entered upon a landscape of very unusual character, remarkable because, while for about 150 km. in an airline its altitude varied between very narrow limits, there rose above the wide plain innumerable, peculiarly shaped hills, resembling islands, steep and rocky and several hundred, yes in certain cases more than 500 meters high. . . . Neither to the north nor to the south is there any end of the landscape to be seen. Even from the summit of a hillock nothing but the plain and the inselbergs rising above it was in sight. The higher we ascended the greater the distance at which such mounts came into view, their bases still lying below the horizon.

"A day of rest for the porters was employed in ascending the inselberg known as Mtandi. There being no path we climbed chiefly along a steep, waterworn cleft, winding between blocks of rock as big as houses, and in about two hours we reached the summit of the cliff that rises behind Massassi mission. An additional march of about an hour took us to the highest summit. More than half the mountain slope exposes bare and generally

¹ Bornhardt, W., *Zur Oberflächen Gestaltung und Geologie Deutsch-Ostafrikas*, Berlin, 1900.

rounded rockmasses. In the clefts between the rocks grow small trees and bushes. The jointing facilitates the percolation of water, which appears as springs lower down.

"The panorama from Mtandi is one of the most impressive that I have observed in East Africa. . . . One is at once struck with the marked contrast presented by the far spreading landscape. On the eastern horizon are to be seen the extensive, level-topped plateaus (mesas of Lower Cretaceous formations) while in every other direction stretches a much lower, wooded plain, relieved by inselbergs of curious forms. The many conspicuous inselbergs assume even stranger shapes the farther west they stand. Rounded domes alternate with sharp pinnacles and broad, smooth turtle-backs."

Von Staff, one of the geologists of the Tendaguru expedition of 1909-10, which collected dinosaur remains in this region and worked out the general geology, confirms Bornhardt's description of the inselbergs and gives a detailed account of a conspicuous example, a mountain called Namwiranye, situated in latitude $9^{\circ} 40'$ S. on the bank of the Mburuku River.² This peak, which is 360 meters high above the river, stands about 6 miles (10 km.) west of the Cretaceous, whose strata once covered it and extended westward far beyond it. That is to say, this inselberg and the inselberg landscape of this region are of pre-Cretaceous age. Since the Cretaceous is underlain by the Jurassic in neighboring areas, the landscape is of pre-Jurassic age and older.

The type of elevation which Bornhardt called inselberg is characterized by a massive form, which is bounded by very steep or precipitous sides of bare rock and which projects from the plain with little or no pedestal or talus slope. The slope is obviously determined by the jointing or schistosity, while the rounded summits are shaped by spalling, as in the case of the domes of the high Sierra Nevada of California.³

Bare surfaces, dome-like summits, precipitous sides becoming steeper toward the base, an absence of talus, alluvial cones, or soil, a close adjustment of form to internal structure, these are the distinguishing characters of inselbergs in the type region. They characterize also many other residual heights in various parts of Africa and elsewhere where the terrane consists of gneisses intruded by granite and traversed by aplite and quartz, provided the physiographic history of the region has at some period progressed to the stage of development of a peneplain. The most con-

² Von Staff, H., *Beiträge zur Geomorphogenie und Tektonik Deutsch-Ostafrikas*; *Wissensch. Ergebnisse der Tendaguru Expedition, 1909-10*; *Archiv für Biontologie*, Vol. 3, 1914.

³ Gilbert, G. K., *Domes and Dome Structure of the High Sierra*; *Bull. G. S. A.*, Vol. 15, 1904.

spicuous examples known to me are the great peaks that dominate the harbor of Rio de Janeiro, Brazil; Stone Mountain, Georgia, is a well known individual of this type; and smaller knobs or groups of huge boulders protruding from a plain will be recognized by many geologists as instances within their own fields of observation.

It is desirable thus to insist upon the typical form, without special emphasis upon height or size, because there has been much confusion of the inselberg with other kinds of monadnocks. Mt. Monadnock may at one time have been an inselberg, but having been modified by glaciation and soil accumulation it no longer has the typical characteristics. Its name has become a generic term for residual hills without distinction of species. Inselberg, on the other hand, denotes a very special type. This fact has not always been recognized. Jaeger, for instance, describes as inselbergs the hills which occur in the northern part of Tanganyika territory and adjacent Kenya, between the great Rift valley and Lake Victoria. They rise from the Zerengetti plains, the favorite resort of big game hunters, and constitute the height of land which since the Miocene and earlier has been the divide between the Congo or Nile and the eastern watershed. They are incised by ravines, run out in spurs, are soil covered and wooded, and descend to the plain by gradual slopes that sweep out to the level. They are residuals because they stand at the heads of the streams and have been but weakly attacked, whereas inselbergs survive, wherever they occur, because they offer unusual resistance to attack by atmospheric agencies.

It does not seem necessary to pursue the discussion of other types to emphasize the contrast. We may pass on to the consideration of the processes and conditions that give rise to inselbergs.

The region where the type is most characteristically developed has a warm, humid climate and that also is the condition in the vicinity of Rio. Georgia has a more temperate climate at present and examples of inselbergs occur in non-glaciated regions much farther north in America and much farther south in Africa; but recalling the long life of the residual heights we are justified in considering the warmer and possibly more humid conditions of the Tertiary, at least as far back as the Miocene. The point is that warmth, moisture, and abundant vegetation favor rock decay and rock decay is an important, we may even say determining process in the isolation of an inselberg. Pumpelly was the first to recognize the preparatory work of secular rock decay in connection with the products of disintegration.⁴ Branner ascribed to it the separation of the great mono-

⁴ Pumpelly, Raphael, *Secular Rock Disintegration*, etc.; *Am. Jour. Sci.* 3rd ser., Vol. XVII, p. 136.

liths or inselbergs around Rio.⁵ The great depth of decay of gneisses in the southern Appalachians, where it exceeds a hundred feet, is well known. And in Africa itself the German explorer described the general occurrence of red soils of the peneplain surface, while the erosion of the mantle of saprolite on the plateaus of Tanganyika is a cause of anxiety in that Territory. I myself have there observed localities where the gullies resulting from a road had within the last few years been washed out to depths of more than fifty feet and the destruction of the surface was spreading rapidly. The gneiss was decomposed to the very bottom of the exposure and the limit of erosion was set only by the local base level. In the general process of decay, however, residual boulders, piles of boulders, and small residual hills of chemically and physically resistant rock had become more or less definitely isolated.

Rock decay has, however, a definite lower limit, the level of ground water, and can penetrate to depths below a given level of that kind only if the level itself is lowered. The possible height of a residual mass, which it may attain while the ground water level is constant, is therefore limited. The possible height can be increased only by lowering of the ground water level.

During a constant stand of height of land above base level the ground water recedes gradually as canyons deepen and rock decay follows suit. The height of a residual mass may increase accordingly, provided that the summit be not lowered at a rate equivalent to that of the corrosion of canyons. Now it is obvious that erosion over wide areas proceeds less rapidly than corrosion of canyons, with the result that we observe hilly landscapes, and it follows that especially resistant bodies of rock will tend to maintain their original elevation even more persistently. Their height above the ultimate peneplain will depend upon the relation between the rate of corrosion in the valleys and the rate of waste of their denuded crests.

The postulates so far consider simply the effects of a single topographic cycle. It is demonstrable, however, that inselbergs have survived the passage of two or more cycles of great duration. Thus in East Africa Wayland recognizes two extensive peneplains and a later cycle. The earlier peneplain survives only in areas where resistant rocks, such as quartzite or quartz-rich gneisses and massive granite prevail.⁶ It has been

⁵ Branner, J. C., *Decomposition of Rocks in Brazil*; Bull. G. S. A., Vol. 7, 1896, pp. 256 *et seq.*

⁶ Wayland, E. J., *Geological Survey of Uganda, Summary of Progress, 1919-1929, 1931*, p. 19.

Combe, A. D., *Geology of Southwest Ankole*, Geol. Surv. of Uganda, 1932, p. 7.
Willis, Bailey, *Peneplains of East Africa*; *Geographical Jour.*, Vol. LXXXII, pp. 383-84, 1933.

identified in the plateaus of southwestern Uganda, a thousand miles from the coast, and also in the coastal region. In the latter it is partly covered by Lower Cretaceous and Jurassic sediments and is the original plain from which the inselbergs described by Bornhardt and von Staff stood out. In its present aspect it is a very recent peneplain or mature land sculptured on the original, which from Lower Cretaceous time on to the late Tertiary or Pleistocene was completely buried and has only relatively recently been resurrected.

The younger of the two peneplains recognized by Wayland, his Peneplain II, is of early Tertiary and Miocene age and constitutes the surface of the vast plateaus of East Africa in most of their extent. It is dominated by residual heights of various kinds, among which there are many kopjes of characteristic inselberg type. They are, however, smaller, less lofty than the giants that astounded Bornhardt.

The summits of the latter no longer represent any ancient surface. They must have been lowered during the lapse of ages since they were kopjes in an extensive plain. But the surface around their bases had been lowered relatively to their summits some two or three thousand feet more before the Jurassic, and after the uplift and erosion that characterized the Permian.

Thus the past of the typical inselbergs of the East African coast comprises their first appearance above the surface perhaps as early as the late Permian, their complete isolation as dominant features of the Jurassic landscape, their burial beneath sediments of the late Jurassic and Lower Cretaceous invading seas, their resurrection during the Tertiary, and their rejuvenation by recent planation of the plain about their bases. They are extraordinary features of the landscape, paralleled within my observation only by the islands and peninsulas of Rio, though suggested by the resurrected monadnocks of the Washitaw mountains, Oklahoma, which have much in common with the typical inselbergs.

We may now sum up the conditions that favor the development of typical inselbergs. The are: 1, a terrane composed chiefly of gneiss or schist, intruded by granite and traversed by veins of aplite and quartz; 2, vertical or steeply dipping schistosity and jointing, which in general facilitates the decomposition of the rock and which serves to give precipitous faces to more massive or more quartzose bodies; 3, a climate characterized by warmth and humidity, favorable to abundant vegetation and the resulting processes of rock decay; 4, notable uplift, which in the usual case will be found to have progressed *per saltum*, that is with marked variations in the rate of elevation.

The longevity of inselbergs is a result of their resistant character as

rock masses and of the relative immunity which they owe to their form. In the initial stage of their development the future summit is represented by a core or boulder incased in saprolite. The general development of the landscape is presumably that of a matureland or peneplain and the eventual exposure of the incipient inselberg is the result of removal of the cover by any of the common processes of erosion, by wind or water according to the climate and the conditions of the site. Piles of boulders which constitute the typical African kopjes are of wide-spread occurrence in wasting peneplains of that continent and elsewhere. They testify to the superior endurance of the smooth, hard, rounded, close-knit masses of chemically resistant rock.

Rain penetrates them to a very shallow depth only. Evaporation is rapid. There is no soil cover and little soaking, oxidizing effect. Vegetation and its effective acids are wanting. Water gathers in spreading runlets or temporary sheets, which find but few sand grains with which to cut and quickly lose efficiency as they spread over the larger circumference. Wind, which also carves with sand and is obviously effective at moderate elevations above the surface in semi-arid climates, becomes ineffective as the level of the sandblast sinks below the upper part of the kopje. Thus the summit and steep sides are subject to the ordinary processes of wear in very minor degree only. The one effective attack is that of temperature changes, which cooperate with internal strains, existing especially in massive granites, to produce spalling. Extensive sheets loosen, break up, and slide off, but the progress of the wasting is relatively slow as compared with that of erosion on the weaker gneisses and schists of the characteristic terrane.

According to observation and by definition the rock of a future inselberg differs from that of the surrounding terrane chiefly in resistance to decay and the core, which is to become a kopje and eventually an inselberg, can be isolated only to the degree and to the depth to which decay progresses. The effect of this limitation is to restrict the growth of an inselberg to tens or at most a hundred feet, more or less, during any one topographic cycle. Repeated uplifts are necessary to develop greater heights, but given a succession of them the altitude which an inselberg may eventually attain above the surrounding plain will depend only upon the endurance of its summit against spalling and the resistance of the mass in general to decay on joint planes.

To Bornhardt belongs the credit of having been the first to recognize inselbergs as a peculiar type of residual hills; but speculating thirty odd years ago concerning their origin he was handicapped by the limited development of physiographic studies in general and by that lack of appre-

ciation of the subject which was then common among European geologists. He did, however, endeavor to explain these peculiar features. He suggested that the region of their occurrence had been repeatedly eroded, submerged, elevated, and re-eroded, in such manner and with such diverse tilts that valleys had been cut criss-cross across the area and the inselbergs remained isolated in the interspaces. He, himself recognized the artificiality of the idea and later withdrew it, but he had a basis for his hypothesis in the fact that the plain is a result of river planation and in that particular region the inselberg landscape has been submerged and buried beneath sediments, from under which it has again appeared.

Passarge,⁷ having observed inselbergs in the Kalahari desert, became convinced that they were characteristic desert forms and sought to explain them as such. His arguments are of little avail in view of the fact that inselbergs are of common occurrence in regions where the assumption of a desert climate is wholly without valid ground if not meteorologically impossible at any time during the later Mesozoic or Tertiary. It is not necessary here to do more than to advert to the studies of desert features by Davis, Bryan, Lawson, Johnson, and others, which in recent years have elucidated the processes of erosion in deserts, without having described typical inselbergs.

The term inselberg originated with Bornhardt and appears to be most appropriate to the peculiar type of residual, which is most strikingly characterized by resemblance to an island rising from a water surface. There has been a tendency, however, to apply it to any island-like hill and this has gone so far that von Staff suggested that the use of "inselberg" with a specific meaning be abandoned. The situation is further complicated by the introduction of the translation, *island mount*, as a somewhat general physiographic term. Under these circumstances it may become desirable to follow the example of Davis, himself, who has named a variety of physiographic features after some eminent geologist among the first to recognize them, and to designate a residual hill which possesses the peculiar, typical characteristics of a true inselberg, a *bornhardt*.

Stanford University,
December, 1933.

⁷ Passarge, S., Rumpflachen und Inselberge; Zeitschr. der Deutschen Geol. Gesell., Band 56, 1904.

Ibid., Die Kalahari, Berlin, 1904.

Ibid., Petermanns Mitt. 1923, Heft 9 and 10, 1924.

